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NINTH BIENNIAL REPORT

OF THE

State Board of Forestry

OF THE

State of California

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HUMBOLDT REDWOOD PARK.

—"It was the past. And this was the redwoods' secret, their special magic, that they absolved, blotted out, the fever of time, the wasted years, the sickness of mind, in which men spent the loneliness of their lives."

Joseph Hergesheimer.

LETTER OF TRANSMITTAL.

SACRAMENTO, CALIFORNIA, January 2, 1923.

HONORABLE WILLIAM D. STEPHENS,
Governor of the State of California,
Sacramento, California.

SIR: I have the honor to present herewith a report, entitled "Ninth Biennial Report of the State Board of Forestry of the State of California."

Very respectfully,

M. B. PRATT, *State Forester.*

IT IS high time we, as a nation, were taking steps to carry out a national reforestation policy, or this nation will find itself out of lumber," says Captain Robert Dollar of San Francisco. "Keep out the fires after logging and nature will reproduce another crop. We must stop wasting timber and utilize it closer, or in twenty years the Pacific Coast will be mighty short of timber. Have seen Michigan and Lake states swept pretty clean of their timber, and we on this coast are fast heading in the same direction."—*The Timberman.*

STATE FORESTRY POLICY FOR CALIFORNIA.

The California State Board of Forestry believes that the continued prosperity of the state is dependent upon the continuance of a forest and brush cover on its mountain slopes. This cover must be maintained for three great reasons:

1. To insure a continued supply of timber.

2. To insure a continued supply of water for irrigation, domestic and navigation purposes.

3. To insure recreation areas for the people.

In addition to these three major lines of forestry work, there is that of highway tree planting, in which the State Highway Commission and the State Board of Forestry are cooperating, in an effort to have the state highways lined with shade trees.

CONTINUANCE OF A SUPPLY OF TIMBER.

The industries of California are dependent upon a plentiful supply of timber, which can only be secured through the wise use of what we now have.

The forests of the East have been largely destroyed, and millions of dollars are now being spent in an effort to bring them back to something of their former productiveness. The forests of California will renew themselves, as a rule, if forest fires are excluded. Natural reproduction is usually sufficient to restock logged-off lands in the Sierras, and in the redwood region the sprouts that come from the redwood stumps rapidly grow into merchantable timber, if they are protected from fire. We can never expect to have our forest areas perpetuated until forest fires are kept down. The State Board of Forestry and the United States Forest Service are doing their utmost to prevent and suppress fires in the forests of California. The lumbermen are cooperating in splendid fashion to the end that much of the area which has been and is being logged may be so protected that it will bear a second crop of timber for succeeding generations.

FORESTRY IN THE REDWOOD REGION.

The possibilities of a second crop on cut-over redwood lands have been brought to the attention of the lumber companies operating in the redwood region, in such a conclusive manner that the majority of the large operators in Humboldt and Mendocino counties have decided to practice forestry on their holdings. In a general way it has been realized for some time by foresters that the redwood region afforded an unexcelled field for the practice, but it was not until investigations were made, particularly by the Division of Forestry of the University of California and Major David T. Mason, forest engineer, that the redwood lumber companies were convinced that the practice of forestry could be made a paying proposition.

It is estimated that there is enough standing redwood timber to keep the mills running for about one hundred years longer, based on the present cut. As the supply of timber decreases in other parts of the country, however, the demand for redwood lumber will increase. Even

now some of the large operators are planning on increases in their cut. This means that the estimated supply of virgin redwood timber is going to be exhausted in considerably less time than one hundred years. Since it takes a redwood tree fifty years to reach merchantable size, it is evident that it is high time that forestry be practiced on cut-over redwood lands, in order that timber may be of sufficient size for cutting when the virgin supply is exhausted.

Natural reproduction from stump sprouts and seedlings will provide about fifty per cent of the new timber growth in the redwoods. The other fifty per cent of the timber must be furnished by planting trees. The Union Lumber Company, at Fort Bragg, has established a nursery to raise trees for this purpose, and has planted several hundred acres of their cut-over lands with different species, as an experiment to determine which ones are best adapted to their section. The Pacific Lumber Company, at Scotia, plans to establish a nursery for propagating trees to be planted on their logged-off lands. Both these companies, in addition to other large operators and owners of redwood timber, will protect their cut-over lands from fire, which does so much damage to the young trees.

The State Board of Forestry is intensely interested in the forestry developments in the redwood region, and it was for the purpose of lending its aid and encouragement that a meeting was held with members of the California Redwood Association, in San Francisco, on March 10, 1922:

MR. MACDONALD: Gentlemen, we have met here today to discuss a question in which we are all interested. Mr. Pratt has an idea that he would like to discuss forests problems. I know that the redwood men would like to meet Mr. Pratt and the California Board of Forestry for the same purpose. I can not go very deeply into this subject myself. I used to think I knew a lot about it. I used to walk through the forests and think: "Oh, well, I know this game"—and then I met, among other foresters, Major Mason, and we had long discussions, and as a result of these discussions and the further result of reading a very long and interesting report on reforestation of the redwoods, I have come to the conclusion that I do not know very much about it and therefore can not discuss it.

This is primarily a "get-together" meeting, as I understand it, in the hope that the redwood men and the State Board of Forestry can get together on the basis of cooperation looking to the reforestation of redwood cut-over lands.

I might say for the benefit of those present and those who do not know it, that some of the redwood operators, representing about 55 per cent of the total mill cut of the state, have in the last year employed Major David T. Mason as forester to lay out a plan of reforestation, to suggest a program and to recommend a method of procedure. Major Mason has given this work a lot of time and a lot of study and has made separate reports, I believe, to those who employed him for that purpose. We shall doubtless get the benefit of the reaction from his studies before this meeting is over.

Now, as I said before, I have come to the conclusion that I do not know very much about this question. Governor Pardee has given this subject a great deal of thoughtful consideration, and I wish, therefore, to introduce Governor Pardee as the chairman of this meeting.

DR. PARDEE: Gentlemen, the State Board of Forestry do not claim to know any more about redwoods, or any other kind of timber, than Mr. Macdonald, and we do know that we do not know as much about it as he does. The state board, of course, is interested in all the forests of this state. We have no pecuniary interest, to be sure, but we have an interest as citizens to see the forests Used, *Used*, USED—but to the best possible advantage, not only by those who own them, but by the people of the State of California and by the whole people of the United States of America.

The state board has no fixed ideas. They have some ideas, of course, but those ideas are open to change, to modification, to revocation, and we want to talk the matter over with the redwood people as we have talked it over with the pine people. We are going to lay all of our cards on the table—what few we have—we have nothing up our sleeves—we have no concealments to make. We are going to be on the square as well as we know how to be, humanly speaking, and we are not only going to take you into our confidence, but ask that you take us into your confidence and tell us everything you have on your minds.

I remember some very red-hot meetings that the old State Board of Conservation had some five or six years ago with the timbermen of this state, and everyone of us said exactly what we thought and we said it pretty loud, but we left the meeting room understanding each other a whole lot better than we did before the meeting. Now, the state board is of course interested in forests. First, in the perpetuation of the forests by having them Used, *Used*, USED, don't forget that, under the best possible conditions, and then we want to see (if it is a possible thing to be accomplished), we want to see all the cut-over lands reforested where it is the economical thing to do.

I remember in 1872, when I was a young boy visiting an uncle up at Arcata and Eureka, of having a conversation with him about the redwoods. I said, "Uncle Lewis, how long are these redwood forests going to exist?" He replied: "Why, Georgie, they never will be exhausted." And yet even in my lifetime at the present rate, (I will not use the word destruction,) but at the present rate of use, all of us here can see the end of them. Now the use of the forests by the owners is a perfectly legitimate one. The state board has no quarrel with them on that score, but the state board is a conservation board in the best sense of the term. It wants the forests *Used* (that is the third time I have said that), but used under the best possible conditions, and it wants to see that the cut-over lands are reforested. I have been told several times, in a somewhat joking way by redwood people, that the redwood is a sort of asbestos tree, yet we can see a lot of trouble in the redwoods from fires. I instance the Big Basin where there has been a lot of trouble, and as I walk through the redwood forests I see the effects of the fires that have been.

Now the state board is interested as citizens and as officials in protecting these forests, and you of course, as owners of timberlands are interested. Beyond that, you are interested as citizens in seeing that they are protected, not so much for the benefit of posterity (which has not done much for us yet) but for our own benefit, and so, as I say, we are willing to lay all our cards on the table, face up, and we are going to talk just as we think we want you to do the same thing. If you have any doubts we want to know them and we want to get your ideas and then we are going to sit down and talk the whole thing over and we are going to come to some conclusion that will be at least partially agreeable to all of us, and that is all we want to accomplish.

First of all, I think it would be well to get the board's attitude. In fact, I am going to call upon our State Forester, who is the expert of the board, to line up the board's attitude. After that, I am going to call upon certain gentlemen to tell what they think and everyone here to tell what he thinks, and then we will shuffle the cards and deal a new hand all around.

MR. PRATT: When I read Major Mason's report I was more than ever convinced that there is no forest region that is more susceptible to forest management than the redwood region. I heard him talk at the University the other evening, at which time he gave the measurements on certain second-growth areas in the redwoods. I was astounded to hear that there was an area of second-growth redwood timber, forty-eight years of age, which gave a yield of over 130,000 board feet per acre. I doubt whether you can equal a growth of timber like that in any other region in the world. We do not consider second-growth timber as being of great value at the present time, but when we consider that Europe is depending almost entirely upon what we call second-growth timber and paying large prices for it, we can see the possibilities of a second crop of timber in this country.

Major Berry told me he paid $25 per thousand feet stumpage for maritime pine in France for trees that were planted twenty-five years ago. This was for very inferior material. We would not consider it good for much of anything in this country—not as good as Monterey pine, which we do not cut for lumber. The supply of virgin timber in the United States is going to be exhausted within the next one hundred years. In fact, there are predictions to the effect that our supply will be exhausted within the next fifty to seventy-five years.

We are trying to secure a second stand in the Sierras in the pine region through fire protection. Colonel Greeley says that forestry is 75 per cent fire protection. Dr. Schenck of Germany, who used to be head of the Biltmore School of Forestry in this country, says that Colonel Greeley is wrong—that forestry is 95 per cent fire protection. The problem in the Sierras of securing a second stand is much harder than that in the redwoods, because the amount of slash in the pine region which becomes highly inflammable creates a high fire hazard, and this makes it very expensive to put in a system which will protect it from fire. Major Mason says that much of the redwood reproduction comes from seedlings, which I was not aware of before. It is a simple proposition, after logging in the redwoods, to protect redwood lands, and from the studies which have been made and which will be made by the University of California this coming season I feel sure you will be convinced that the protection of your cut-over lands with the idea of securing a future timber supply is an economic proposition.

What we want you to do right now is to give adequate fire protection to all virgin timber and cut-over lands. We want to help you. I can not say what we can do right now, but we have a little money which we can devote, I am sure, to the protection of these lands. I expect to make a trip to the redwoods this spring and I am sure that we can supplement what we have already done in the past two years in Humboldt and Mendocino counties. What we are asking you to do now is to cooperate with us in protecting your virgin and cut-over timber lands in order that there may be a second crop on these very productive lands.

DR. PARDEE: One of the most beautiful sights I ever saw was a grove of second-growth trees on the main branch of the Eel River up in Humboldt County on what is called "Eleanor Flat."

Fifty-five years ago I lived up on Clay Street hill in San Francisco. One morning my father took me out on the front porth and pointed to what is now called Redwood Peak, on which there was a stand of young redwood trees. He said "My friend Tom Eager went over there ten years ago and cut down all those magnificent redwood trees, and I want you to watch those young trees all the rest of your life." The second growth has come on and has been protected from fire. It is as magnificent a second growth as I have ever seen, for the locality.

You gentlemen are interested in the preservation of the forests and their use. That is the fourth time I have referred to their use. Your money is invested in these forests, while ours is a sort of a sentimental interest, but still not, because upon your prosperity depends to a certain extent ours. Our interests are mutual in the use of the forests and we want to see those forests taken as good care of as the economy of the situation will permit. We do not want any rules that are going to embarrass you—no extra expense put upon you that is not warranted, but we do want to get together and we do want to see these things brought about as well as they may be. Time of course will vary the existing conditions—will change the conditions and will change the rules and regulations which in all probability from time to time may be put out. We have no rules that are fast and fixed, but we are going to put some out after considering and talking with you gentlemen. We may not suit you entirely, but we are going to come as near to it as we can. We are going to get along with you as humanly as we can.

I would like to hear from Mr. Burnett of the Hammond Lumber Company. I want him to tell how friendly or unfriendly he is to the State Board of Forestry.

MR. BURNETT: Answering your last observation first, Mr. Chairman, I might say that we harbor nothing but the most friendly feelings for the State Board of Forestry and it will not be our fault if that feeling does not continue.

Some time since—possibly within the last six months—some of the redwood operators, mindful of their own interests and the development of their own operations, mindful also of the duty they may owe to posterity, mindful of their own sentiments (and they are capable of harboring the same sentiments that are found in the breasts of the State Board of Forestry), mindful of all these things, a group of redwood operators who represent at least 50 per cent of the total cut of the state, felt that in Major Mason they had found the person above all others who was best adapted to go over their lands and make a preliminary report on the physical possibilities and from an economic standpoint, of reforestation and continuous forest management, and to that end Major Mason was so employed. His studies in connection with the economic aspects of the lumber industry and his residence in the timber section, peculiarly fitted him for the job and added great weight to whatever his conclusions might be. Within the last six weeks Major

Mason compiled his report which was in two parts; that is, a general report on the general subject and to each company employing him a brief summary of the conditions bearing upon that particular company's own operations, its cut-over lands, etc.

Now, Major Mason happily is with us and as has been said already at this meeting, the question of reforestation is so largely bound up with the question of fire protection that I feel that Major Mason's discussion of the subject (he summarizes it pretty briefly) will point the way to what may be necessary or proper in the way of fire protection. I therefore believe that without further extending my remarks we should call upon Major Mason to give us the result of his observations as succinctly as he can.

DR. PARDEE: First, may I ask the attitude that the Hammond Lumber Company will take, that is, as to whether it is quite friendly toward reforestation and fire protection? I ask that question simply to clear up what has already been said. Will there be any objection on the part of the Hammond Lumber Company to a policy of this kind?

MR. BURNETT: None whatever.

DR. PARDEE: Major Mason, you should have a lot of things in regard to reforestation and fire protection on your mind—will you please accommodate us?

MAJOR MASON: If I told you all I had on my mind, I am afraid I would keep you too long.

I want to thank Mr. Burnett for his kindness in thinking that I am qualified to look somewhat into the redwood situation. I would like to impress upon you if I can, first of all, that what these redwood owners have been doing is truly a remarkable and unique thing in the management of American forests. There are in this group of companies the Hammond Lumber Company, The Little River Lumber Company, The Pacific Lumber Company and the Union Lumber Company, representing about 55 per cent of the annual redwood cut. This group owns about two-thirds of the timber owned by operators. The Union Lumber Company has already adopted the policy of managing its land permanently for the production of timber crops. The other companies have had submitted to them this report upon the basis of which they will decide as to whether it is practicable to raise crops of timber on their lands or not, and if not, why not. Personally, I think that it is economically practicable to do this. All I can do is to put my personal opinion before you in this matter.

I want to impress upon you that this relatively and actually large group of owners in the redwood industry has taken this forward step in the matter of forest management. In all the rest of the United States, I venture to say, not as many lumber companies are doing likewise. There are one or two companies in the pine region of California which have done a little toward protecting the second growth, with the thought that they may possibly manage the lands themselves or trade them off to the government. In the south, in the Gulf States, there is one notable example of a lumber company adopting a policy of forest management, and that is The Great Southern Lumber Company, which has adopted the policy of reforesting its cut-over lands. So the redwood industry has the honor then today—California has the honor of having this industry foremost among the lumbermen who are considering seriously the practice of forest management.

I want to tell you as briefly as I can of some of the things which appeared from this study of the redwood situation. In the first place, the climate of the redwood region, as you all realize very well, is favorable to timber growth. The very long growing season of the lower elevations particularly is just as favorable as that of any other region in the United States. Along the Gulf Coast there is also a very long growing season, but in the timber-bearing part of that region it is no longer than in the redwood region. The redwood region has the additional advantage that the soil is very much more favorable to tree growth. The fogs are favorable. But of all, redwood is a species of tree which, on account of its ability to grow in close crowded stands—its intolerance of shade—enables it to produce much larger yields of timber per acre than is possible in the case of the characteristic long leaf pine, an intolerant tree, of the Gulf Coast. So, we have a very favorable group of circumstances for the growing of redwood timber.

In order that any owner of land may take up forest management, it must first of all be possible to grow considerable quantities of timber of valuable species, and we all know that the redwood is a valuable species—extremely valuable in the old growth. We do not know so much about the second growth yet, but we are safe in

assuming that as the virgin timber supply is exhausted, this second growth will have a high value. That is the history of every forest region, that the second growth comes to have a high value when the old growth is gone. In fact, it usually has a much higher value than the old growth at the time when the old growth was at the height of its production or exploitation. We can look forward then, I believe, to very satisfactory markets for second growth timber. As Mr. Pratt has mentioned, the growth of the species is amazing. It is amazing to see how much redwood will grow in a given length of time on good soil. Mr. Pratt did not give this particular area he spoke of full credit. In the first place, only about 90 per cent of the measured area was occupied by second-growth and instead of 130,000 feet to the acre, it was 137,000 feet to the acre, forty-eight years old. Such a stand of timber as that is a remarkable one anywhere. There is no record of second growth of soft wood that has ever given even approaching such a yield as that. We must of course keep clearly in mind that this particular area was on the very best possible quality of soil—a deep, alluvial, river bottom soil along Big River, ten miles south of Fort Bragg.

The average quality of soil, in my judgment, when properly managed will grow annually about 800 board feet per acre each year, but this growth while it sounds low, as compared with the 2800 feet of the stand mentioned before, is still an exceedingly high growth as compared with the growth of other species in the United States. We have then the species and the climate which will produce a heavy crop in a reasonable length of time. These redwood trees of the age of forty to fifty years are easily of a size to be considered first-class saw timber in any other region than California, Western Oregon and Western Washington. In fact, in other regions of the United States many of those trees would be considered unusually large.

I was rather interested in what Mr. Pratt said of Colonel Greeley's comment that forest management is 75 per cent fire protection and Dr. Schenck's criticism that he was wrong—that it was 95 per cent. Here in the redwood region we have another pecularity—that fire protection is not as large a proportion of the problem as it is in the judgment of Colonel Greeley and Dr. Schenck. They are no doubt right as applied to the country in general, but the redwood forests are unusually safe from fire. I do not mean by that, that there is no danger from fire, for I am well satisfied there is, but the safety from fire is much greater than it is in any other region (excepting the southern cypress swamps) that I know of. The protection of the old growth redwood is an unimportant matter relatively. It is something that should be done because it is believed that it will pay, and it can be done quite easily and at a decidedly low cost. In protective work the aim should always be to reduce losses plus cost of protection to a minimum. If you have no protection your losses are apt to run too high. If you have too intensive protection your costs will run too high. It is cheaper to take some losses with a fairly good system of protection.

There are two distinct phases to the matter of fire protection. One is with reference to the second growth, and the other the old growth timber. I think there is no disagreement among those who are at all familiar with redwood that second growth, especially before it reaches the age of twenty years or so, if it is going to be managed at all, must be protected from fire; but there is quite violent disagreement as to whether it is necessary or desirable to protect old growth timber. Men who are absolutely honest, who have been in contact with the redwoods for a great many years, who are thoroughly familiar with the situation and who are good observers, have told me that they are thoroughly convinced that it is not necessary to protect old growth redwoods because fires do not occur in old growth redwoods—at least to an extent that warrants any expense whatever for protection. I want to say that I have the greatest respect for those views although I differ most radically from them. Probably neither I nor the others who think differently have yet gotten all the facts. We must get more facts about the matter of protecting the old growth to know just what ought to be done and how best to do it.

I want to give you briefly my reasons for believing that old growth as well as second growth needs protection. In the first place, any living tree is producing wood—it is growing—it cannot be alive and not grow. It will each year produce a layer of new wood between the older wood and the bark. Now, that does not mean that invariably each live tree has a net production of wood for in some other parts of some trees there may be a loss which offsets the new growth. There are various things which cause loss. One which is going on constantly in a great many trees, especially in the older trees, is the consuming of the

tree by disease—the tree is gradually rotting away. Fortunately, again in the redwoods we have a species which is consumed only very slowly by disease, but it is attacked, and injured, and slowly consumed. Now this is one of the factors which offsets growth. It may be said that in all probability the old growth redwood forests as we see them today are in just about the same condition as they were one thousand, two thousand or three thousand years ago. Ever since the climate has been as it is now in all probability the redwood forests have been in substantially the condition in which we now find them. Without those destructive forces and with the growth of the wood going on continuously, there would be a very much larger accumulation of wood than exists today.

I have already mentioned rot as working against tree growth, but that is not the only thing. The other principal destructive force has undoubtedly been fire.There have been many fires in the region. I do not know of a single acre of old growth redwoods which does not show fire scars—usually rather severe fire scars. It is believed that fires have occurred on each acre on an average every seventy, eighty or one hundred years in the life of the stand. It has been said that the Indians used to set fires to clear out the undergrowth so that travel would be easier. At any rate, there have been fires and those fires have done damage. Fire and rot working together have balanced growth.

Since there has been a great deal of discussion as to how much damage is done by fire in old growth redwood it appears that the logical thing to do is to find out. We are not going to settle anything by arguing. We must get the facts as to how much loss there is when fires occur. We must also get the facts as to how often fires have occurred within the past twenty years, for instance, under various conditions in the old growth, and with those facts it will probably be evident whether we should protect, or should not. I am of the opinion that the facts will show that fires are injurious and that we should protect, but it may be that the others will have the best of the argument when we get through. If forest management is decided upon by the companies who are considering the matter, but have not yet decided upon it, they will of course install a protective system for their second growth lands, and that protective work can automatically be extended to the old growth if, and when fires do occur.

We find in the redwood region some very fine stands of second-growth, Some examples have already been given. There are a number of thousand acres altogether of excellent second growth stands which were originally reproduced partly by sprouts coming up from the stumps and partly from root suckers and seedlings which came up in the space between the stumps. But those fine stands that we find are practically all of them more than twenty years old today, and that is because in the older cuttings it was customary for the early operator to leave some of the redwood trees that were not very promising. In addition, a great many of the Douglas and white firs were also left, and they seeded up between the sprouts. But present practice of cutting removes practically all the trees, so that the reproduction which does occur consists almost solely of the sprouts from the stumps. The indications are that these stump sprouts will furnish the necessary reproduction for about 50 per cent of the area—the remaining area being left to grow up to brush, or perhaps, in some cases left for grazing, but at any rate it is not reforesting as did the areas cut over in earlier operations.

If forest management is to be put into effect one method is to leave seed trees (which was done unintentionally in the older days), but probably that will not be done on any very great scale for two principal reasons: One that the seed trees are too valuable from a stumpage point of view to justify leaving them, and the other that the seed trees which would be most effective if left at all would be Douglas fir and white fir, which species are probably less desirable than redwood for reforestation purposes. For these reasons it looks as though it would be better to plant seedlings in the space between the stumps to reforest the other 50 per cent of the area.

What are some of the reasons why owners and communities should be interested in reforestation? The redwood industry characteristically is one in which the operations are large, with heavy investments in large plants. It is a wood which tends to specialty uses which means more refinement at the plants, and consequently, more expensive plants. Further plant investment will most certainly go on for a number of years to come. If something is not done to provide for a perpetual supply of raw material for the plants, some day very large investments will have to be scrapped and practically thrown away. The cost of reforesting is in my judgment small as compared with the benefits derived, especially from the point of view

of maintaining these expensive plants. It is on the some theory as that of applying a coat of paint to an iron bridge every year to keep it up. One can afford considerable expense in maintaining a valuable forest property rather than to let it go to pieces.

Another reason for forest management is the relation of the public to the lumberman. The public, whether the lumberman likes it or not, feels that it has a most decided interest in how these lands are managed. Take the community around about Humboldt Bay, for instance, where there are many who feel that Eureka has a very unpromising future, because some day the timber will all be gone and with it most of the prosperity of Humboldt County. The same thing applies to the railroad that runs to Eureka. If the supply of timber comes to an end, it is highly improbable that the other resources of Humboldt County will justify maintaining a railroad. On the other hand, if the forests are maintained there, the railroad tonnage will not only be fully kept up as at present, but to my mind can be greatly increased, and there can be a greater development of the forest industry and of the dependent industries than there is at present.

There are of course, a great many other points in connection with this whole subject which could be taken up, but I think I have tried your patience long enough already and will stop at this point.

DR. PARDEE: Major Mason, you say that you were employed by 55 per cent of the redwood owners?

MAJOR MASON: Yes sir.

DR. PARDEE: What became of the other 45 per cent?

MAJOR MASON: I believe that the other 45 per cent will also at some future time be interested in this subject.

DR. PARDEE: Is it not interested now?

MAJOR MASON: I do not know.

DR. PARDEE: Is it enthusiastic?

MAJOR MASON: Not that I know of.

DR. PARDEE: It is small stuff people?

MAJOR MASON: No, I would not say that. The three largest producers are in this group who are doing something. In the 45 per cent there are some other owners who are also large producers; but I will say this: In the case of a number of the smaller producers, their ownership of land as to acreage is not such as to make forest management a very encouraging proposition for them—not all of the others but some of the others. There are some of the others who probably would find forest management as beneficial as any in this group who are interested.

DR. PARDEE: The example of the big people will have a good effect on the little fellows?

MAJOR MASON: I think it will.

MR. BURNETT: In regard to the 45 per cent, I do not know whether they had a chance to be other than silent or not, but I am sure that Major Mason did not intend to omit anybody. My idea is this: The report as I have mentioned, is in two parts. The major portion is a general study. It is my idea to talk the matter over with the Secretary of the Redwood Association or with the California Forest Protective Association with the object in view of having this report mimeographed or printed so that you gentlemen may all have a copy, and this silent 45 per cent can get it and read it and think it over.

DR. PARDEE: (To Major Mason). Major, what have they done toward the protection of cut-over land, if anything?

MAJOR MASON: Probably the only protective work—in fact, about the only fire protective work is being carried on by the Redwood Fire Protective Association in Mendocino County. Its executive officer, Mr. Swales, is here and can tell you a great deal more about it than I can. In the case of most of the other owners I might say they have believed up to the present, that the cut-over lands should be managed for grazing. I am speaking now of the companies in Humboldt County where cut-over land is more valuable for grazing. Up to this time their object has

been to keep the land in good condition for grazing, which of course does not at all oppose fire.

DR. PARDEE: Are there any owners of small tracts of 160 acres or half sections?

MAJOR MASON: Relatively few.

DR. PARDEE: A large percentage of the acreage is so that they can be rounded up and talked to, and persuaded, if possible?

MAJOR MASON: I should judge so.

DR. PARDEE: Well, the outlook is not very bad then?

MAJOR MASON: I should say the outlook is good. I believe that within the next four or five years that anywhere between 60 and 80 per cent of the redwood cut will be coming from land that is under management.

DR. PARDEE: We have made a start at it then?

MAJOR MASON: A fine start, I should say.

DR. PARDEE: I should like to hear from Mr. Cole of the Little River Redwood Company.

MR. COLE: We are one of the smaller mills who participate with the larger mills in engaging Major Mason in this review of the whole cut-over situation and the reforestation of the redwood lands. For many years the handling of our cut-over lands has been a real problem. We did not know what we were going to do with these lands, if they were cut over like most of the other operators, we had the idea that their greatest economic use was for grazing purposes. In the next place, we made no special effort to keep fire out, so long as the fire was under control. This was the general situation in Humboldt County. When the proposition was first mentioned of Major Mason's being engaged we submitted very graciously and I think that all of the other smaller operators would have done so, had they been approached without protesting the small cost. There is a very cordial feeling in Humboldt County toward the State Board of Forestry on account of what they have done along conservation lines. It must be very heartening to the redwood people here to have them express themselves as they did, for the economic aspect of reforestation is one of the many aspects that would first have to be considered. In connection with the economic aspect there is the question of taxation that is still one of the features that will cut a very large figure, it seems to me, in what the redwood people are going to decide to do in forest management, if the counties adopt the policy that has prevailed up to the present time. Another thing to be considered is this: If the redwood man protects his forests and gets a reasonable second growth, as that forest grows up the assessment rate will continue to climb and the redwood operator and timber land owner I am afraid, will be obliged to forget the duty he owes to posterity of which you speak. I believe that the State Forestry Board has it within its power to render not only the redwood operators, but the forest owners in California and the public as well, very signal service in connection with some state policy looking to assistance in carrying these lands, because from what you have said I know that you appreciate that forest owners are not the only ones interested in the perpetuation of the forests and for that reason I think the owners should not be the only ones to carry the burden of perpetuating these forests. Undoubtedly we will be forced to take care of trees that are growing and to see that potential groves are given an opportunity to develop, but as to whether we can go further than that is a question we have not decided. Major Mason's report is going to have this effect: That insofar as we are concerned we will make an effort to keep cattle out of our lands and keep out fires and I know that the people of Humboldt County are all anxious to cooperate with the State Board of Forestry. We are simply looking for light to work together to see where the best can be accomplished.

MR. WILLIAMS: This question of taxation, Mr. Chairman, seems to be the nubbin of the whole situation, and it has been running through my mind that it would be a good idea to have a committee appointed, composed of a member from this association, one from the pine association and one from our own organization, to make a study of this taxation problem and to report back a tentative plan. In Louisiana, the plan is to encourage the care and protection of cut-over lands and a specified rate of taxation is made for a period of from 15 to 40 years, the owner of the lands

complying with the conditions imposed by the law. Something of that sort might be introduced into this state with a great deal of benefit to the state and to the operators as a whole. I believe a plan of this kind would be worthy of consideration at this time.

DR. PARDEE: The state board has had in silent consideration this question of taxation for some time, but you have got to educate the people of this state—they are not yet educated up to that point. There are counties in this state where, I am told, that if the redwoods were not taxed there would be no public schools. I do not know how true that is. You have got to educate your people, but I do not know how we can go about that yet—and still Captain Williams' suggestion as to a joint committee to study the situation and report on it at some future time is a good one and ought to come, but of course you would have to amend your constitution in various and sundry ways and get the support of your people throughout the state to carry such a constitutional amendment or several of them, if necessary, so that the question is a very deep one and can not be decided off-hand, but a lot of these other things can be put into operation or started, in the way of saving second growth, keeping the fires out and taking care of what we already have, so whenever your association wishes to appoint such a committee as Captain Williams has spoken of I have no doubt in the world, in fact I am willing to hazard the statement, that the State Board of Forestry will be glad to cooperate, remembering, however, the difficulties of the situation and the things that must be overcome in order to produce the result.

I would like to hear from the Union Lumber Company. I remember a very pleasant visit I paid to them in old Fort Bragg, and I remember some discussions we had in the old Conservation Commission with the representatives of the Union Lumber Company. They were warm at times, but I must say that we left the room very kindly disposed toward the Union Lumber Company, in spite of the hard things said about us.

MR. JOHNSON: I remember the circumstance to which you refer. About this fire protection, we do believe in protecting timber. It is little damaged when fire gets in, but the cost of protection is so small that it is wise to protect it. We also believe in protecting cut-over lands. We are going to do that. It is also our intention to do something with the acreage that is cut over. This approximates about 1000 acres a year. We do not know exactly what to do, because the more I look into the reforestation problem the more I realize it is an inexact science. We have had some expert advice and we do not know just exactly what to do. The State University has put in a lot of trees at our place. Of course, we know that redwoods sprout freely. I tried to stop that. Years ago I became a rancher and we tried to make a ranch out of 4000 acres of cut-over land. There are still 1000 acres that are pretty well cleared off. The other 3000 acres are covered with second growth and yet we spent a lot of money cutting down the sprouts every year, but at any rate I will say that if that was a crime, "the punishment fitted the crime," and we managed to make a pretty good showing every year by increasing the price of butter, and in that way the farm made some profit.

To me it is a wonderful thing that the State of California has a Forestry Commission that is striving constructively with the lumbermen to work out their problems. I am very much impressed with what Major Mason has said, not only here, but in his report about the peculiar condition of the California redwood section, in connection with reforestation and I hope a lot of the others will do as we are doing, although I do not know whether that will have any influence on a future lumber supply. Now, about a yield tax—I am afraid of a yield tax, because I do not know what kind of a yield tax it will be.

DR. PARDEE: Neither do I. It is sometimes better to "endure the evils we have than to fly to others we know not of." That is why we have been so slow about everything of this kind. Your company will, I hope (I almost said "of course"), be willing to go into a sort of partnership with the state board in this matter—so that we can go in and inspect your lands and then sit down with you and smoke our pipes and talk it all over.

MR. JOHNSON: Yes, we will be mighty glad to have you do that. And you will have a fire guard right around you, so that if any fires are started, we can put them out.

DR. PARDEE: Do you remember, it used to be the opinion in the old days that the fishermen set the fires—will you admit fishermen?

MR. JOHNSON: Yes, we will be glad to let them come up.

DR. PARDEE: We will lay out a sort of a disjointed plan—one that will fit generally, perhaps rather well, but that will fit in a way, and then we can cut, and splice, and refit to suit the locality and in that way we can perhaps arrive at some conclusion as to what should be done at the start to protect cut-over lands, and, perhaps, before it is too late some of these experts can tell us how to make the cut-over land pay better as reforested land than as grazing land. I have almost always been opposed to turning cut-over lands into grazing lands. To my notion, although I am not an expert, the people who are doing that are not making much headway, except in certain localities. All those things must be considered, and we are going to sit down with our corncob pipes and talk it all over. It may be that some of our preconceived ideas will have to be modified on both sides, somewhat. We are willing to modify ours, if we have to, but we are going to be as reasonable as human beings can be in regard to those things, and we are going to visit you and talk with you about it and do whatever seems to be the best thing to do as a starter and let the thing develop as it will. Now, Mr. Johnson, while I think crop taxation is all right, I do not know what kind of a tax it is going to be, but I am willing to try something once, always, and we have got to make a start along those lines somewhere—when or how I do not know.

MR. MACDONALD: Chairman and gentlemen—this proposition of a crop tax and the governor's statement that he is willing to try anything once makes me think that it is something like the smallpox. The changes in taxation methods are not unlike the smallpox—if it does not kill the patient, it is going to leave a lot of bad marks, and I think this matter of taxation is one that should receive very serious consideration before it is experimented with.

There is no doubt that in this forest management problem—the reforesting of cut-over lands—there is involved the question of taxation. The private owner of cut-over lands who is reforesting for the benefit of posterity—incidentally, for the benefit of his corporation fifty to seventy-five years hence—must be relieved of some part of the tax on those lands. In Humboldt County, where cut-over lands are taxed, from the poorest lands away up on the mountain and hill sides—regular sandstone country—all the way from $5 per acre up to $40 per acre, the imposition of the tax becomes quite a burden, if you are not going to get anything out of it. We have been using our cut-over lands to some extent for grazing purposes, but I do not know that that is a paying proposition. In five years after our redwood land is denuded, it grows up so thick with brush that cattle can not make a living and the number of cattle per acre is reduced very materially and the price of clearing land, so as to make it habitable for cows, is too expensive, and, in my opinion, growing out of my experience, I think that the land up there is very largely only fit for reproduction purposes.

And now, on behalf of the Pacific Lumber Company, I want to assure the State Board of Forestry that the Pacific Lumber Company stands ready to cooperate with the state authorities and with the federal authorities and with all of the mill owners in the direction of solving these problems associated with the reforesting of cut-over lands and the protection of the standing timber. I do not know whether it is worth while taking up any more time discussing the question of fires in old growth timber or not. That old growth timber has been there some thousands of years—long before the white man set foot upon this soil, and when the white man came along he found some very magnificent forests. When the Digger Indian went in there he did not know anything about the beetles, and the forester thinks that it is fire that brings the beetle, and I do not know whether it is or not. The Indians used to set out fires to clear the forests, so that their traveling and hunting would be made easier, and those fires doubtless killed the beetles, but the government comes in and says: "We must not have any fires before the beetle comes along, as that furnishes another menace to our standing timber." I think, as Major Mason says, it is a subject for deep study and I do not know whether we can go off half cocked to do something unless we know that that is the proper thing to do.

I think in the matter of solving our reforestation problems we have got to make a start, and from our past experience I believe that our other problems will be solved as we go along. In Humboldt County, up in the Freshwater country, we have about 4000 acres of cut-over lands, which were cut over in the nineties. Major Mason says it is the finest stand of forest reproduction he has ever seen. That land has never been used for grazing, and in the twelve years I have been in Humboldt County I do not know of a fire that has been in there. It is a magnificent

stand of timber and covers about 4000 acres. I think that piece of news should tell us something about how far we should go, or about how far it is necessary to go in order to reproduce timber on cut-over lands in the redwood country. The cut-over lands which have been used for grazing purposes for a great many years will doubtless have to receive some additional treatment in addition to what nature gives, because the cattle trample down everything before them. Mr. Johnson, and Mr. Burnett and Mr. Cole, have so very fully covered the matter from the standpoint of the lumber operator that I do not think it is necessary to take up any more time. We are here in the interests of cut-over land; we are deeply interested in the problem of reforestation and other forest problems, and we invite you all to Scotia with all your emoluments, hereditaments and appurtenances, to stay as long as you please.

DR. PARDEE: I have a very distinct recollection of the hereditaments at the Pacific Lumber Company's plant and the appurtenances thereto appertaining, and look forward with great pleasure to some day accepting Mr. Macdonald's kind invitation.

The question of taxation we are not here to settle today. It is one of the curses of civilization and we have to deal with facts as they come. We will make it a big proposition yet. I am glad to know that this matter of reproduction and the protection of cut-over lands has occupied so much of the time of the gentlemen here today. It may not be amiss to say here that we took our lives into our hands when we went into the forests or visited the headquarters of a forest lumberman in the old days. We would feel perfectly safe now under any consideration and in any circumstances.

MR. MACDONALD: Not only safe but welcome, and we are going on with this work the best we know how, with your cooperation, and we know we will get results sooner or later.

DR. PARDEE: We hope, sooner, but later, if necessary. I would like to hear from Mr. Swales of the Union Lumber Company.

MR. SWALES: I have not much to say other than that we are deeply interested in this subject. In the matter of fire protection, I believe in thoroughly protecting these cut-over lands, and to my mind the problem in that direction is going to come from settlers. As you know, settlers are clearing lands all the time and setting out fires, and last year on the Union lands we had to fight two fires for which we had to pay the expenses of putting them out. We have instructed our patrolmen in going around and calling on them to tell them to watch out for fires. It is going to take some little time before we can get the very best of protection, but I believe in the end we will get it. However, we are making a start. We have also made a start in the reforestation of our cut-over lands. We have put out this year a great many trees for experimental purposes, to find out how they will do and whether they will grow on this slope or that slope. What we want to do, if possible, is to reforest entirely with redwoods. We believe that a solid block of redwood forest fifty years from now will be worth a great deal more than a mixed forest, but we have to experiment first to find out.

I would also like to state further that this year the Union Company is starting a nursery in which we aim to grow 1,500,000 trees and set them out, which will take up between 600 and 1000 acres a year and that is how we feel about this entire forest problem.

As to fire protection in virgin timber I believe that there is a certain fire hazard there, and although we know that fire runs through the redwoods and on going through that same forest after a fire no apparent damage is in evidence, still we know there is pine and tanbark oak burned and that goose pens are made in the redwood trees, which causes a certain amount of damage. The goose pens make it hard for the fallers to lay the trees where they would like to, consequently, they are damaged a great deal. I think, for the small amount of money that it costs, we could afford to pay a tax. The highest assessment we have ever made in our association in Mendocino County is one and one-half cents per acre.

DR. PARDEE: Did that give you adequate protection?

MR. SWALES: Yes, it did. In other words, the trouble has not been in the district which we controlled, but we have been fighting fires outside of our district to keep them from coming in. I think it is very cheap insurance for a timber owner to pay from one cent to three cents per acre for fire protection, for I think he will find in years to come that it will save him money.

DR. PARDEE: Did I understand you to say that fires set by settlers are causing you much trouble?

MR. SWALES: Some of them, yes, and some, no. Some of the settlers do not care. It all depends upon the class of men. There may be some of foreign birth who are pretty hard to talk to and who are suspicious always. I think before a great length of time we will be able to educate these people so that they will be able to see things as we do.

DR. PARDEE: How about the fishermen—any trouble with them?

MR. SWALES: I am one myself.

DR. PARDEE: I used to be.

MR. SWALES: They give us a certain amount of trouble—they are bound to—and the automobilists will cause us trouble always. It is, I suppose, a case of education right down the line. We have got to educate the people of San Francisco, for instance, who desire to enjoy the forests, that they must be careful with fire. The danger does not come from our logging fires, because these are put out instantly, but it comes in almost every case from the man who comes into our camps and goes away without putting out his fire. It is a case of education right here in the big cities, not so much in the forest lands.

DR. PARDEE: The country is being pretty well taken care of in the newspapers, I see, through press clippings—that is, in regard to the necessity for care on the part of the camper, and the fisherman and the automobilist.

MR. SWALES: The Pacific Lumber Company has started something that is a fine thing. They have put tables in their camping grounds on certain of their holdings. People come along and use those tables and go away, leaving them in pretty good shape. The company has, in a way, put them on their honor to leave the place in good condition and the public has come to look upon the company in the light of a public benefactor.

MR. MACDONALD: Do you know that two of the worst fires we have had occurred on the line of the Northwestern Pacific Railroad and were started by section men. it did $5000 worth of damage to the down timber.

DR. PARDEE: The section foreman needs educating, too. Of course, it is a hard matter to get at, but it can be done.

MR. MACDONALD: I have mentioned that because I think that the State Board of Forestry should call the attention of the railroad people to the damage that has been done on account of these fires.

DR. PARDEE: We will make a record of that and see that the matter is taken up with the railroad company.

MR. PRATT: My experience in Humboldt and Mendocino counties has shown that split-stuff operations constitute a great fire hazard. I would like to ask Mr. Swales if adequate protection by the state, of areas lying outside the association's lines, would be the kind of cooperation he would like us to give, rather than cooperation in the protection of the association's lands.

MR. SWALES: I would like to say in regard to that, that I feel this way: We prefer to protect our timber through an assessment made on the various owners. Now, all we would like to ask, and I think Mr. Johnson feels the same way, is that the State Board of Forestry will deputize our wardens and give them power to enforce the state fire laws. We will then turn all violations over to the State Board of Forestry and will prosecute in the name of the state. In other words, we do not want the people to think that it is the Union Lumber Company that is making the prosecutions. That, to my mind, should come through the State Board of Forestry. The outside lands that are not under our association, I think, could very easily be handled through your county warden, who could look after them, and in case we ever wanted to call upon the State Board we could do so in connection with a great many of our problems. We are going to have our forest problems and we would like to feel that we could come to you with them and that you would help us out. Now, as to paying for this we feel that assessing each member will take care of this. What we aim to do in the association is to try and bring all the members who are in there—bring their cut-over lands under assessment. In other words, the Union

Lumber Company and the others who are members of the association are only paying on their green timber, whereas, the protection of their cut lands is being borne by the company itself—that is, the cost of it—so I think any arrangement you would care to make with us would be very agreeable.

DR. PARDEE: I can assure you that we are willing to do anything we can. If I had my way (but I can not have it—I never had it in my life) the State Board of Forestry would furnish protection at the expense of the state—but we can not get the money—the state can not get it for there are governors and legislatures and people like that to consider in the matter. Of course, we will do what we can. How much we can do in this particular case of the redwoods is limited to what we can get, but we are going to do what we can and that just as soon as we can. I rather think that this coming spring you will find Mr. Pratt, or Mr. Rider, or some of our people looking the matter over, or talking with you on the ground and making a report as to what we ought to do, and then we will decide on what we can do, but we will do all we can.

I would like to hear from Professor Mulford.

PROFESSOR MULFORD: If this building is in existence fifty years from today, and there happens to be a meeting in this room of lumbermen and others interested in forestry, I venture to predict that every man in the room will know, without anyone having to tell him so, that the places in the United States best adapted to permanent lumber production on a large scale are these: The southern pineries of the Gulf and South Atlantic coasts; the white pine region of the northeastern states and of northern Michigan, Wisconsin and Minnesota; the Douglas fir region west of the Cascades; portions of the Sierra pine region, and the redwood country. Of all of these sections, the redwood country will be the smallest in area, but in my humble opinion it will probably be one of the two which will produce the greatest yield per acre, the other largest yielder being the Douglas fir country of Oregon and Washington.

The redwood region has a climate and a soil conducive to very rapid timber growth, yet most of the land is not agricultural. It is the home of one of our very valuable timber species. It is easy to start new crops of this species. Water transportation is at hand and the distance is short to what is going to be a great center of population. As a result of this combination of factors, the redwood region holds out great promise. But all this is the mere opinion of a college professor and, therefore, worth nothing. I, myself, would not spend my money on such generalities.

We want, not generalities, but facts. Last summer, four members of the forestry faculty of the University of California were discussing how we could best use the small amount of money and time that is available for investigative work. We decided to give up all our other investigative work for the present, in order to get facts regarding the redwood region. This was done in the face of the fact that some of the projects to be discontinued are of real importance. We are now devoting practically all the funds available for investigations to work in connection with second-growth redwood. I want to report this action to you in order to prove to you our interest in the redwood region and our faith in its future.

The figures Major Mason has just given you were gotten by the Division of Forestry of the university, as the beginning of this program of ours. The figures thus compiled are the first of a long series that we hope to obtain. We already have much data from different sources. When the work is completed, it will be at your disposal.

DR. PARDEE: May we not hear from Mr. James?

MR. JAMES: We have no cut-over lands. We are not operators. We are merely holders of timber land and therefore I am not competent to speak on the question of cut-over lands, but I have thought a great deal about this reforestation question and am deeply interested in it. I have thought all along that the greatest obstacle in the matter of reforestation is the taxation problem, and I don't know but that I think so still. I am pretty certain that the holders of redwood lands would do everything in their power to reforest the lands, if they did not have in front of them the bugbear of high taxation for the next fifty years. If you will just figure up the taxes—not to speak of the interest on the investment—but just take the taxes, and the interest on the taxes, you will discover that it amounts to a great deal more than you realize. I have, therefore, always maintained that one of the greatest obstacles in the way of reforestation is this question of taxation. However, if that could be put, as Captain Williams has suggested, on the basis of a minimum assessment, I believe one of the greatest obstacles in connection with the redwoods would be done away with.

In regard to fire protection: We all claim that the redwoods do not need much protection, but we keep an eye on them just the same. Speaking of settlers causing trouble, some eight or ten years ago we had a fire in the redwoods and I called upon one of the settlers for help. When the fire was put out, I sent him a check for $25. It developed that whenever that settler wanted a little money, after that, there was always a small fire in the redwoods. My observation is that large operators and timber owners are taking good care of their lands—it is to their interest to do so—and I do not know that we can improve very much on their methods. It would be hard for me to suggest any other way in which we could improve on the methods employed by the large owners of redwoods. We do not do very much ourselves, although in every locality in which we have timber, up in Humboldt and over in Mendocino, we have men who keep us posted on anything that is going on and they let us know immediately about fires. We have found from observation that trouble comes from outside ranchers clearing land and from the split-stuff operators— those small fellows with about forty acres or so—who go away and leave everything unguarded that is a menace to the country. If some way could be devised to regulate these things without working a hardship on the large operator, I believe it would be a good thing.

As I said at the beginning of my talk, we are not operators, but we are with the State Board of Forestry and with the operators who have gone to the expense of engaging Major Mason to give his opinion on these matters and we would like to see more of the land reforested.

DR. PARDEE: I would like to hear from Mr. Rhodes of the California Protective Association.

MR. RHODES: Something has been said here about cooperation and I believe that almost everyone who has spoken has mentioned it. Last fall, after a study of about a year, I wrote a series of four papers on Timber Growing in California, and the last one of them—the fourth—was devoted to the subject of cooperation. I think the way that worked out was that there should be cooperation on the subject of securing a full stand of timber, and in working at those papers the matter of having a full stand of timber on any land that will grow trees showed up as very important. If half of the land only is growing timber it may be compared to the wheat farmer who has only half of his land sown to wheat, and who has to charge off against that half crop the expense of growing it, taxes, insurance, fire protection, etc., so that it seems to me that cooperation to the end of having a full stand of timber would be one of the best things that the owners of timber lands could undertake.

Another way in which cooperation could be carried on would be in the number of trees to plant to the acre and the kind of trees in different locations, and those things that Major Mason has mentioned in a practical way as being contained in the reports which he has made and which I hope we will have an opportunity of seeing. Cooperation of this kind will mean that each one will have a different experience and from these experiences all will learn, so that it will not be a very great number of years before the combined experiences of all will go a great ways toward showing what are the best methods to be adopted to get a full stand of timber.

As to protecting the timber from fire, which is the next matter of importance, in my opinion, you will find that your cooperation reaches out a little further. First, you cooperate among each other. Then the counties are interested, as they are getting some revenue, and will have to protect the timber from fire. Next, the state will have to be interested, and they are interested, as shown by their presence here, and the federal government will have to be interested, and they are interested, as evidenced by their cooperation under the terms of the Weeks' Law.

Now, as to the matter of taxation. It happens that in this state, under our system of taxation, that the counties are the only ones particularly interested in the tax on timber lands. The state does not tax them, so that there has to be cooperation with the county assessors and boards of supervisors in the matter of taxation. They must be brought to see that it is going to take a long time for these trees to come to a profitable size and that the people of the county will get a great part of the benefit from them, and that in the end there will be an income from these growing trees—there will be something there to tax, but that until that time they can afford to lay down on the annual tax—that is—to keep it within a certain limit. I believe that it ought to be kept around five cents per acre. That amounts to two and one-half cents on $100 assessed valuation. Then we would have to meet this proposition that in some of the counties, and more particularly in Santa Cruz, they are assessing some of the cut-over land ten cents to fifteen cents, and in some cases, twenty cents

per acre, and that is too high. It will be necessary to impress upon the county assessor that as the timber gets big it is worth a lot more than when it is smaller and it will have to be assessed higher. We may have to handle it in the counties, but it will eventually come to the point where there will have to be some legislation to help fix that, so that the county assessors would not be apt to oppose the tax.

There is another element and I should say that that would be cooperation between state authorities, the owners and the federal authorities who have to have the utilization and distribution of forest products because by their influence on freight rates and the methods of utilizing timber and the influence they will have with such men as architects and builders. Insead of having that certain influence they might be called upon by such an institution as the Forest Products Laboratory at Madison, Wisconsin, they can put a considerable percentage of short lengths on board cars. That would be cooperation in the matter of utilization and distribution, so that there are all those interests that can cooperate in all those propositions.

Then there is another. In order to do this, we have to have the cooperation of the public through publicity. That was one element Major Mason touched upon. He spoke of the natural conditions favorable to timber growing in California, and it has struck me in making the studies that I did, that many of the large sawmills own their own timber lands, carry on their own logging operations and everything that happens, from the growing of the timber to the cutting or sawing of it is carried on as a unit. It is a different matter in a country where one man owns the timber, he sells it to the logger and the logger sells it to the mill. There is not that unification in the matter of economy. It seems to me with conditions in this state which are so favorable for the reproduction of second growth timber from an economic and industrial point of view, that the owners of cut-over lands should be encouraged to bring them under reforestation as quickly as possible.

The California Forest Protective Association, having worked with all these different agencies and with all these things in view, is willing to cooperate with the State Board of Forestry with the idea in view of coming to a better understanding and carrying the message back to the timber owners and operators, and we will be glad to continue in that work.

DR. PARDEE: Thank you. I do no know all of the gentlemen here but I hope everyone has something to say. Mr. Hickey, have you anything to add?

MR. HICKEY: I have nothing to say.

DR. PARDEE: Are you agreeable?

MR. HICKEY: Very much so.

DR. PARDEE: Has anybody else anything to offer?

MR. BURNETT: I would like to make this suggestion. There has been some discussion of yield tax. The thing has gone along so far that it seems a very difficult matter to approach as regards standing virgin timber, but I do think it would be well worth while to determine what is the revenue derived by Humboldt County from cut-over lands. Have you such a study, or do you have lands that have not been devoted to grazing?

MR. RHODES: We have them up to 1913.

MR. BURNETT: There is nothing insuperable about getting an amendment to the constitution that would exempt from taxation lands which are devoted to the raising of another forest crop. The time to do that—put through such a thing as that—is now, before the revenue outlook is large and before it amounts to something that is impossible to face. What I am wondering is whether or not we are going to repeat the conditions that are extant in Michigan, or, are we going to work out a policy in the nature of perpetual forest management. I believe there is something to be done in regard to this now. I can conceive of an amendment to the constitution going through that would determine as to whether certain lands were so dedicated, so being used. I do not believe that is beyond the realm of possibilities at all.

DR. PARDEE: That part is comparatively easy. I had in mind the greater subject of yield tax which is a different proposition altogether and would be a serious matter and require a great deal of attention.

MR. BURNETT: I believe it would be a good plan to start a yield tax on second growth timber.

DR. PARDEE: Speaking of Michigan, I was down there several years ago and I went around quite a little. I do not know when or where I have seen so many discouraging things. Nobody dared paint his house, and when I inquired why,

they said they did not dare to because if they did the assessor would come around and raise their taxes. If we could take our people to Michigan and Wisconsin and other places where things like that have happened—give them a sort of an excursion—I believe it would be worth while for I believe after such an excursion we would have an easier time with our people than we have under existing conditions.

I wish somebody else would tell us something—Mr. Sinclair, have you something to give us?

MR. SINCLAIR: I think that it has been said here that it rests very largely—I am speaking now of this subject of taxation—on whether or not there will be a large effort made to reforest cut-over lands. I know the situation up in Mendocino County now and the tax burden is pretty well divided as between the ranchers and the timber owners and each side is now bearing its share of the taxes. The timber owner claims he gets but one crop and the farmer gets a crop every year. If we start in to raise another forest that strengthens their arguments.

DR. PARDEE: What is being done, or in contemplation of being done toward educating the farmer up there?

MR. SINCLAIR: Nothing at all.

DR. PARDEE: Why not start? You look like a good starter.

MR. SINCLAIR: As Mr. Rhodes has said, I will cooperate with anyone who makes the start.

DR. PARDEE: But you are on the ground. Why not start that propaganda going around there yourself? What is the matter with the local papers? You can start something practical. That would be a good job to tackle.

MR. MACDONALD: In Humboldt County the timber interests and the other large property owners are in favor of a tax commission and a tax commission was recently appointed which met with favor on all sides, to equalize and adjust taxation.

DR. PARDEE: Who appointed the tax commission?

MR. MACDONALD: The board of supervisors at the suggestion of the assessor.

DR. PARDEE: That is a good start. Anybody else?

MR. HOLMES: We concur in what has been done and we are willing to cooperate.

DR. PARDEE: Are you willing to trust us a little further?

MR. HOLMES: Yes, we are.

DR. PARDEE: We want to know if we have the confidence of the timbermen or not. While they may not agree with us and think us foolish, still we want their confidence and we ought to have it, we think.

MR. HOLMES: There is one thing about the timber owners—in regard to their taxes—they feel that foreign corporations are cutting the timber and they are getting the worst end or it right along—it is more of a political game—they are trying to soak the timber owners—he is legitimate prey.

MR. WILLIAMS: One word in answer to Mr. Burnett's statement regarding taxation. His idea seems to be that all taxation should be removed from cut-over land until it reached maturity—is that it, Mr. Burnett?

MR. BURNETT: Yes.

MR. WILLIAMS: If you attempt legislation of that kind I believe you are going to have the antagonism of the counties. I believe that a fixed tax rate—a small one for a certain number of years—

MR. BURNETT: (Interrupting) You mean a fixed assessment?

MR. WILLIAMS: Yes, at 5 cents or 10 cents per acre for a period of years—say 30 to 50 years. If you do not do that you are going to encounter opposition from these timber growing counties.

MR. BURNETT: That may be. I had not given it any thought. I was only willing to differentiate in regard to the exemption of taxation from second growth crop as against virgin timber.

MR. WILLIAMS: The Louisiana law provides that these tracts are to be protected from fire and maintained in a growing condition under the direction of the state authorities. That is their plan and I would be pleased to send a copy of that law to anyone who may be interested in having it.

MR. HICKEY: They grow timber quicker in Louisiana than they do here. I went over the timber in Louisiana.

MR. HAMMATT: I just want to add in connection with the question of cut-over land taxation, I dropped into a small office in Boston and I found there three timberland owners—one from Massachusetts, one from New Hampshire and one from Maine, a professor of forestry, a state forester and one of the federal forest men, all talking over the same problem and their problem was—a definition of what is cut-over land which is being devoted to forest growth. That seemed to be their main question and it brought out the question of taxation and what the amount of the taxation should be. The question of cooperation with the County Assessor seemed to be pretty well solved—at least so I judged from the conversation, but, I merely mention this to indicate that other states that have had a great deal more experience than California are working on it and are apparently getting somewhere on it.

There is one other thing I would like to mention, and that is, that the California Redwood Association is interested in all these problems. They are interested in cooperation. I think you can figure out for yourselves just how interested when I tell you that it was through the Association's efforts that this meeting was arranged and there is to be considered besides the question of a future stand of timber the question of more complete and more economical utilization of the material itself. We are attempting to do our bit through cooperation with the State Board of Forestry, the owners, and other organizations in regard to this question of utilization and the association is carrying on a number of experiments and intends to carry on a number more which we think will help.

MR. COLE: When I brought up those various questions a few minutes ago, I had in mind a clear division between standing timber and cut-over land. I do not think that standing timber has anything to do with cut-over land. In standing timber we have an economic problem which has nothing to do with the perpetuation of our forests. When I spoke of relief in the way of taxation I did not think of suggesting that there should be any interference with our present method of taxation.

DR. PARDEE: You are another one who is afraid of changing the tax laws. I will take the liberty of suggesting that we ask Professor Mulford to say a few words on the question of taxation. Professor Mulford was one of the members of the committee who went into the taxation question extensively.

PROFESSOR MULFORD: I used to think that I knew something about forest taxation. I know now that I do not know a thing about it. I would like to learn something about it.

DR. PARDEE: You have come to the wrong place if you are looking at me.

PROFESSOR MULFORD: I mean that literally—that I do not know. I wish we could have a careful study of this whole thing made, especially of the cut-over land.

DR. PARDEE: How would you suggest that it be done? The state board has been considering it a long while. One of the very first things that the board had up for consideration was this question of taxation of timber land—cut-over and standing—and we are no nearer a solution of the problem than we were when we started. It is all a muddle yet. What have you got to suggest in regard to it, Professor Mulford?

PROFESSOR MULFORD: I do not like to make any suggestions offhand. I would like to think it over a week.

MR. JOHNSON: I would like to express my appreciation of what the Forestry Department of the University of California is doing. For the past year they have done a great deal of experimental work in our country and I had the great pleasure of going over to the University and I wish that every redwood man could go over there and see what they are doing in the way of practical work. Another thing, we are apt to look upon college forestry as a thing not practical perhaps, but we have had some results from that department that have shown up wonderfully well.

DR. PARDEE: I am glad to hear my alma mater praised. I would like to hear from Mr. Wheeler.

MR. WHEELER: I do not believe that I have anything to add. I was unavoidably unable to be here at the beginning of the meeting. I can say this, however, that we are entirely in sympathy with the efforts that the State Board of Forestry is making to work out these various questions and I feel that there is a lot of work to be done in this matter of taxation. I sympathize heartily with the views expressed here today. There are problems which should be settled in some way but just how it is hard to say.

DR. PARDEE: Is there any way in which you gentlemen up in the redwood counties can start propaganda in the newspapers?

MR. MACDONALD: You mean in the matter of exempting denuded lands being used for reforestation purposes?

DR. PARDEE: Yes, is that possible?

MR. MACDONALD: I believe we could get a little more publicity. When these open spaces are being replanted and the actual work going on, I think we can get a better reaction from the public than we have, but we could stand more publicity. Mr. Johnson has done that— God bless him!—We are a little behind, but we are going to catch up.

DR. PARDEE: God bless you, too! Perhaps it would be well if the newspapers had something concrete to talk about in the way of reforestation.

MR. MACDONALD: I guess you are right. But there are a lot of places where they will need to have education. In southern California they need a lot of education about forest taxation.

MR. BURNETT: It seems to me a very simple proposition. It can be shown that southern California is not paying anything in taxes for reforestation that is being done in Humboldt and Mendocino counties, although they get the redwood with which to build. It seems to me that it would not be a difficult matter to get a constitutional amendment through.

DR. PARDEE: It would be better if you could get it into the newspapers and get it talked about, it seems to me. They are very touchy about taxation matters in southern California.

MR. MACDONALD: I just have a thought. In counties like Humboldt and Mendocino, for instance, as the years go on and the virgin timber is cut off, a large portion of those counties will come under what we call denuded land. As that land is denuded it is used for reforestation purposes and as I see the situation, the tax burden is merely shifted from one shoulder to another. It is not fair to have the timber growing counties bear the entire burden of harvesting the timber for the rest of the world and in any provision for a forest scheme for this state I believe that point should be kept in view.

DR. PARDEE: Like the taxation of the railroads.

MR. MACDONALD: You can readily foresee what would happen in a county like Humboldt that is practically all timber.

MR. BURNETT: What will become of those timber lands if not put into forest reproduction? If they are going to be used as grazing lands, or otherwise, then it is perfectly obvious that the county would not be losing anything at all if they were only taxed for a fifty-year period on a grazing basis. By that exemption there would be wealth created which would not be created but for the exemption so long as forest lands are taxed on a basis that would represent their fair assessed value as grazing lands or whatever use they may be put to.

MR. MACDONALD: A scheme of taxation to encourage reforestation would not presuppose such a large assessment as $40 per acre. These counties need a certain amount of money to carry on their governmental activities. Counties like Humboldt and Mendocino which embody large areas of timber which is being cut off, thus taking off of the assessment roll highly taxable property would make considerable difference in the revenue derived by the county. Take, for instance, a thousand acres passing into a tax schedule based upon a reforesting proposition, the low assessment is going to throw a certain amount of tax, upon the resumption of taxation, upon the other property for the benefit of the state and the county. I do not know whether it is going to be treated as a national proposition or not. When your timber is all off, fifty years from now, your new crop will be coming on and taxed low and I can not see the tax picture fifty years from now.

DR. PARDEE: Has anybody else anything to offer. We want to know what you are thinking about.

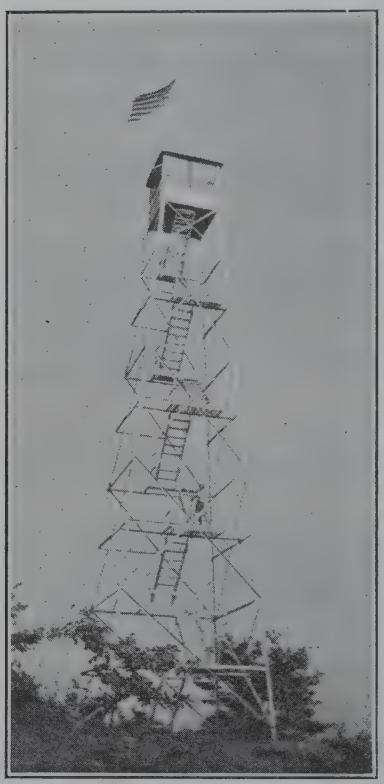
MR. MACDONALD: I am thinking about getting back to my office before five o'clock.

DR. PARDEE: The state board may get out something in the way of a questionnaire. I do not know what form it will take, but when you receive it I wish you would fill it out and return it promptly. We want to know if you are interested enough in the thing to answer it. When we can get the money we are going to put some rangers out around the country to help you. Perhaps that will answer your question that a state ranger with a badge on will have more authority and will command better attention than your own employees.

I thank you for coming here today. We want you to understand that we are interested in all your problems and we want to help you solve them, if we can. We are willing to go along with you as far as we can and if it comes to a parting of the ways, we part, that's all, but we want to go the whole way and we are going to do that if it is a possible thing to do, and we are going to hold you to the same thing.

MR. MACDONALD: On behalf of the lumber industry I want to thank the representatives of the State Board of Forestry for coming here today and listening to our difficulties.

DR. PARDEE: That was our plain duty and our great pleasure, gentlemen. If there is nothing more to come before the meeting, I will declare it adjourned.



The first steel lookout to be erected by the State Board of Forestry is located on Mount Bielawski, Santa Cruz County.

Fire burning down hill on "light burning experiment." Burning material which rolled down hill ahead of main fire set fire which burned up hill.

FORESTRY IN THE CALIFORNIA PINE REGION.

The State Board of Forestry believes, that if fire is kept out of cut-over pine lands in California, natural reproduction will establish itself in the majority of cases. Fires in pine slashings not only destroy the young growth that is left, but also tend to make conditions such that it is extremely difficult for a new crop of seedlings to become established. In its dealings with the pine lumbermen of the state, therefore, special emphasis has been laid on the exclusion of fire from cut-over lands as an effective means toward the establishment of a second crop.

At a meeting held by the State Board of Forestry with the lumbermen in November, 1920, the lumbermen present agreed to dispose of the slash resulting from their operations in such a way as to reduce fire menace and protect reproduction, the method used to be left to the discretion of the operator.

Field examinations during the summer of 1921 by members of the State Forester's office disclosed the fact that the methods used by the pine lumbermen vary greatly, and demonstrated that the agreements between them and the Board of Forestry should be along more definite lines.

The State Board of Forestry, therefore, outlined the three following methods of slash disposal and fire protection for the pine region, either of which would be acceptable, and sent them to all the pine operators for their guidance:

METHOD I.

Operator agrees to:

1. Pay the State Board of Forestry from 2 cents to 4 cents per acre for each acre of his holdings, or 5 cents to 10 cents per thousand feet base meridian on annual cut of large operators, the exact rate to be determined by agreement between operator and the State Board of Forestry.

2. Immediately suppress all fires resulting directly from his operations and exercise the following precautions:

A. Clear all inflammable material by burning or otherwise, in a manner satisfactory to the State Board of Forestry, for a radius of not less than 100 feet from all donkey and skidder settings. Each donkey and skidder crew will be equipped with the necessary fire fighting tools.

B. Fall all snags over 20 feet in height on future cuttings within 100 feet of any railroad right of way, or any publicly traveled road.

C. Instruct wood bosses, camp bosses, contractors and foremen to use every precaution in preventing fires.

D. Install spark arresters on all donkeys, skidders and locomotives as required by state law.

E. Permit the State Board of Forestry to post suitable signs and warnings at all camps and logging operations.

F. Provide a reasonable number of men for fire fighting outside of immediate operations of company when requested by the State Board of Forestry, whenever it is not practical for the State Board of Forestry

to secure men from any other source, with the understanding that the State Board of Forestry will be responsible for the payment of all men so furnished.

The State Board of Forestry agrees to:

1. Arrange for a suitable detection system and protective system.

2. Clear railroad rights of way and publicly traveled roads of such inflammable material as in its judgment may be necessary for proper fire protection of each area.

3. Maintain a patrol system.

4. Suppress all fires occuring on the operator's land that are not directly the result of his operations and pay the cost of suppression.

5. Relieve the operator of all responsibility for slash disposal.

6. Post the operator's lands with fire warnings during the fire season.

METHOD II.

Operator agrees to:

1. Construct fire lines along railroads and publicly traveled roads by burning slash in strips of reasonable width on each side of railroad or road and to fall snags above 20 feet in height on these strips.

2. Clear donkey and skidder settings of snags and inflammable material for a distance of 100 feet at least. A further distance may be specified if thought necessary by the State Board of Forestry. Donkey engine and skidder crews are to be equipped with the necessary fire fighting tools.

3. Observe the state law regarding the use of spark arresters on donkeys, skidders and logging locomotives.

4. Suppress and bear cost of suppression of fires on his holdings. Method of suppression must be satisfactory to the State Board of Forestry.

5. Dispose of slash as may be agreed upon between the State Board of Forestry and the operator.

6. Provide a fire detection and protection system satisfactory to the State Board of Forestry.

METHOD III.

Operator agrees to:

1. Pile and burn slash as at present required by the United States Forest Service regulations on timber sales.

2. Provide for a protective system satisfactory to the State Board of Forestry.

The character of the cooperation received is summarized in the following article.

SLASH DISPOSAL IN THE CALIFORNIA PINE REGION.

W. B. Rider, Assistant State Forester.

When the new State Board of Forestry took office in 1919, it immediately realized that one of its greatest problems was to secure some method in the California pine region whereby young trees and seedlings, commonly called reproduction, would be left upon the ground, after logging operations were completed.

At that time only two methods of slash disposal in pine areas were being practiced: That of broadcast burning, as used by lumbermen on private lands, which not only killed all reproduction but also destroyed all the seed which might be upon the ground, and which has resulted in large areas reverting to worthless brush; and that of the U. S. Forest Service as used on National Forest Land, of piling and burning all slash at reasonable distances from the young trees left after logging

The only thing in favor of broadcast burning was the cheapness of the primary operation, while the lumbermen claimed that the cost of piling and burning which ordinarily ranges from five to fifteen dollars per acre, according to the density of the stand of timber upon the ground, was too costly to be justifiable, considering the market value of the land after it was logged.

Since both of these methods were apparently open to objection, it was obviously up to the board to suggest some method that would protect the young growth at a reasonable cost.

Believing that the lumbermen should be the best qualified to offer a solution of this problem and realizing that their cooperation was essential, the Board of Forestry called a meeting of the lumbermen on November 5, 1920, which resulted in practically all the pine lumbermen of the state agreeing to dispose of the slash resulting from their 1921 operations by some method that would, as far as practicable, protect reproduction, the method used to be left to the discretion of each operator. During the logging season of 1921, a close inspection of the logging operations was maintained by the State Board of Forestry together with a study of the condition of cut-over areas. This inspection developed the fact that while the pine operators were making an earnest endeavor to arrive at some conclusion, their efforts were not sufficiently systematic to secure the desired results.

The study of conditions on cut-over lands developed the fact that in a great majority of cases where slash remained on the ground, that a very satisfactory stand of young trees was to be found. In cases where cutting had been done ten or twelve years prior to the examination, the slash had almost entirely disappeared, and the young forest was in no more danger from fire than originally existed in the virgin forest.

The observations made by the State Board of Forestry during the field season of 1921, led them to propose to the lumbermen in the fall of 1921, a plan of disposal of pine slash which required that as far as possible all fires be kept out of slashings which were to be left upon the ground. The lumbermen as a rule accepted this plan, and as a result there was a marked reduction both as to the number and size of fires occuring on logged off land.

To prevent the occurrence of fires, some of the companies issued special warnings to their employees regarding care with fire, posted fire warnings, throughout their holdings, employed special patrolmen and additional watchmen, installed a larger number of and more adequate spark arresters, cleared their donkey settings of all inflammable material, cleared their logging and wagon road rights of way, and in a few instances constructed special fire lines. To be prepared to handle fires when they did occur, many companies installed force pumps on their donkey engines and logging locomotives, and equipped these pumps with from 250 to 500 feet of fire hose, apointed camp wardens, organized special fire-fighting crews, and provided additional fire fighting tools.

One company which followed a well-defined fire-protection plan for their cut-over land, including practically all precautions as outlined in the preceding paragraph, had a total cost of only 8.8 cents per thousand board feet for its entire operation. To this cost must be added approximately five cents per acre per annum for the next five years, to cover the estimated cost of fire-protection. Estimating the stand of timber for this operation at twenty thousand feet to the acre, the total cost for the six-year period would be $2.01 per acre, which cost would cover the cost of slash disposal and the protection of the cut-over land from fire. At the end of the six-year period, the slash should be sufficiently decayed and the reproduction sufficiently advanced, for the area to assume the normal protection cost of two cents per

acre. During this period of protection, the value of the land would steadily increase; hence this expenditure certainly seems justifiable on all pine operations on the basis of the market value of the cut-over land. Granting that these figures are fairly representative of the cost of fire protection when slash is left on the ground, it certainly does not appear that pine operators can afford to neglect the opportunity of starting a second forest crop on their cut-over lands.

Now that the operators have borne the expense of the installation of fire prevention equipment, it is expected that their co-operation will be extended to carrying out more detailed plans, and that by next fall, still greater progress in the protection and reforestation of our cut-over pine lands will have been accomplished.

Once the lumbermen are thoroughly in accord with this work, they will not be satisfied until they leave their logged off land in the best possible shape to produce a second forest crop, and in turn this will eventually lead to the use of further practical forestry methods as will guarantee a perpetual cut in the California pine region.

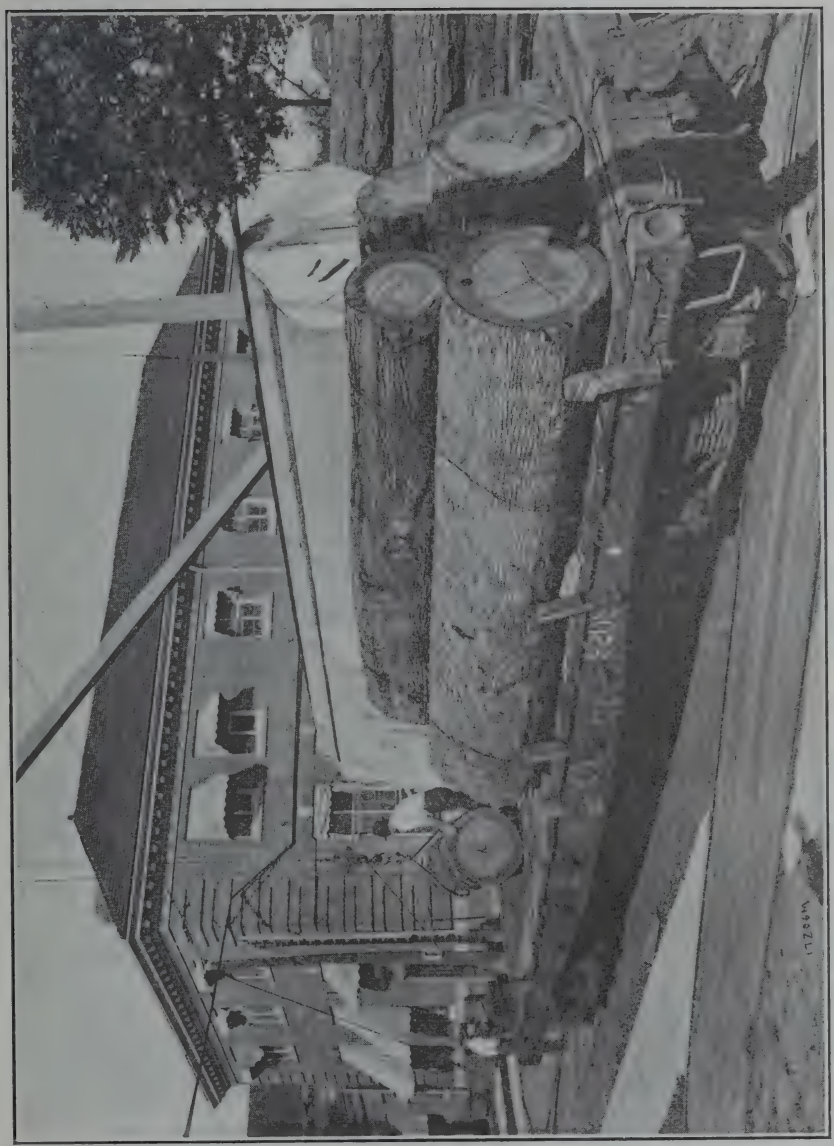
UTILIZATION OF CALIFORNIA WOODS.

The chief commercial woods of California and their estimated stand in the National Forests and on private lands are as follows:

Redwood (Sequoia sempervirens)	85 billion board feet.
Western yellow pine (Pinus ponderosa)	81 billion board feet.
Douglas fir (Pseudotsuga taxifolia)	40 billion board feet.
White fir (Abies concolor)	31 billion board feet.
Sugar pine (Pinus lambertiana)	30 billion board feet.
Red fir (Abies magnifica)	9 billion board feet.
Incense cedar (Libocedrus decurrens)	7 billion board feet.
Lodgepole pine (Pinus murrayana)	5 billion board feet.
Total	288 billion board feet.

The redwood region covers about 1,400,000 acres of which 440,000 acres have been cut over. The pine stands cover an area of 14,000,000 acres, of which 1,300,000 acres have been cut over. The amount of standing timber in California seems ample, at first glance, to supply lumber for many years to come, but when it is considered that it will last less than one hundred years, based on the present cut, and that the cut will rapidly increase as the timber in the eastern states is exhausted, it is apparent that every effort should be made to utilize what we have as completely as possible.

The Forest Products Laboratory, Madison, Wisconsin, is rendering splendid service in working out wood utilization problems. The following article which was furnished through the courtesy of Mr. C. P. Winslow, director, gives information which will be of special interest to the lumbermen and wood working industries of California:



These logs, being unloaded at the Forest Products Laboratory, Madison, Wisconsin, will be cut up into sections of various sizes for testing. Beneath the canvas are 24-foot Douglas fir timbers from the Coast.

INCREASED UTILIZATION OF CALIFORNIA WOODS.

By Ernest V. Jotter, Forest Supervisor, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wisconsin.

A desire to obtain the most complete utilization of timber products and the growing demand for western lumber, have aroused in the California lumberman a keener interest in Uncle Sam's big wood research institution, the Forest Products Laboratory of the Forest Service. Why such research was initiated on a large scale only twelve years ago is easy to understand. Wood in our country has been so abundant and so generally distributed in easily accessible forests, there were so many different species from which to choose, and competitive materials were so few, that more exact information on how to use wood efficiently did not appear essential.

That each species of wood had peculiar properties which fit it for certain uses, and that methods of preparing it for use could be improved through regular and careful study, were not considered by the industry of sufficient importance to demand scientific research. Furthermore, little attention was directed toward the use and development of by-products, or the curtailment of what we now think of as appalling wastes. This was entirely natural; in the gradual growth of a desire for definite knowledge of wood structure and for information concerning the most efficient and complete use of the standing timber, the lumber industry has followed the same course taken by other businesses—the steel industry, for example, which is foremost now in the great dependence it places on the results of laboratory investigation.

Studies of wood, unlike those in the steel industry, are practically confined to one laboratory. This is located at Madison, Wisconsin, and was not established until 1910, by the Forest Service, although the need for research in forest products had long before then been recognized by the Forest Service, and some work had been done in cooperation with various universities. The policy of the laboratory has been expressed by the present director, C. P. Winslow, in these words, "The object of the Forest Products Laboratory is to acquire, disseminate, and apply useful knowledge of the properties, uses and methods of utilization of all forest products. This has been the guiding thought in the development of the laboratory—the systematic acquiring of useful knowledge that may be transformed into the knowledge that builds up American industries."

In order to carry on research most efficiently, the efforts of the laboratory are grouped in certain main divisions, each with its force of investigators best fitted for that particular line of work.

One of these divisions includes among its activities the study of the various processes through which timber passes from the tree to the finished wooden product. In this conversion process it is recognized that there is a heavy loss, which in the case of hardwoods has been placed at approximately seven-eighths of the original volume of the tree. Probably in the softwoods it is not so great. Nevertheless, nearly 2 board feet, on an average, are wasted in the woods and at the sawmill for every board foot of lumber manufactured; the 34½ billion feet cut in 1920 was produced at a loss of nearly 80 billion feet, exclusive of the lower grades of lumber. A part of this woods loss and some of that which takes place during the later processes of manufacture, is apparently unavoidable under present economic conditions. A large share of it, however, can be eliminated; and it is to determine how this may be done that the laboratory has started a systematic survey of the wood waste that now accompanies the logging and milling of lumber, especially the low-grade stock, and the manufacture of wooden articles. In this project the laboratory has the full support and cooperation of lumber and manufacturing organizations. It is hardly necessary, therefore, to explain the necessity for studies of this character, even in a region like that of California, where there is still a large supply of virgin timber and where at times, as elsewhere, there has appeared to be an over-supply of lumber in the market. It is obvious that the supply in the country is limited and that we must use most completely the product of the tree, and it is certainly a distinct gain to the credit side of any operation if it can produce increased quantities of salable material from the available raw product.

Just how does the laboratory plan to cooperate with the industry in reducing these losses?

One method now in operation is the "Wood Waste Exchange." The purpose of this exchange, as stated by the laboratory, is "to effect the utilization of raw material, now disposed of as waste, by supplying a medium through which pro-

ducers can locate markets for woods, mill, and factory by-products and waste, and wood-consuming plants can locate material of this character such as will meet their requirements." Lists of producers and consumers of waste wood material are kept up-to-date, and periodical reports are sent to the subscribers. One of these lists, entitled "Opportunities to Buy Waste," includes information on marketable woods, mill, and factory by-products for sale; the other, "Opportunities to Sell Waste," gives the names of firms which are in the market for the various small or odd sizes of lumber described. This service is free to lumbermen and wood-using plants who wish to apply for it.

Another loss which the laboratory is endeavoring to overcome through study is the degrade or loss of lumber which results from improper seasoning. During the past two years work has been started upon several important problems associated with the seasoning of California woods.

One of these is the nation-wide study of the air-seasoning of wood. Curiously, although this method of drying wood is the oldest and will always be in use, the best practice to follow under any given circumstances has never been determined. The object of this study is to determine the best methods of piling the stock to secure the most rapid drying consistent with minimum degrade, to obtain comprehensive data on the rate at which different species dry under various climatic conditions, and to reduce the loss from stain and decay. Several study units have already been placed in the redwood region, and arrangements completed for the erection, next spring, of five study units in the pine region and several additional ones in the redwood region.

A difficulty which has long been recognized, although no effective remedial measures have been devised, is the brown stain that occurs at times in the sapwood of western yellow pine. Preliminary work has been started on this study, but it is not sufficiently advanced for any definite conclusions to be drawn. It has been found possible to reproduce the brown stain chemically, and it is evident that the submersion of logs for a long period has a very marked effect upon the tendency to stain.

Blue stain in sugar pine and western yellow pine in California caused a loss in 1920 of more than one million dollars. In seeking better control methods, the laboratory has found as yet no absolutely effective method of preventing blue stain other than kiln drying, although air seasoning and treatment with antiseptic solutions are other methods of control that can be applied. For many purposes, however, where the wood is to be covered up or painted and where the use of sapwood is permissible, there is no reason for discriminating against blue-stained material, provided no wood-destroying fungi are associated with the stain.

White fir is a species that forms an apreciable part of the stand, although not always of the cut, in some parts of California. Means of increasing the use of this species are worth while, and it is hoped that the special study of the depreciation of white fir box lumber will bring favorable results. Indications now are that proper seasoning methods will reduce this depreciation considerably. Experiments to develop the best possible seasoning practice are to be undertaken next spring.

Recent developments in dry kiln design have shown the possibility of securing more rapid and more uniform drying than can be done in most kilns now in use. The new type of kiln is especially well adapted to the drying of the various California softwoods.

The kiln-drying of California hardwoods is recognized as an important problem, and it is expected that the laboratory will be able to do some work upon this within the near future.

Several dry-kiln experiments upon madrone have been completed at the laboratory. These indicate that madrone can be dried successfully and at a reasonably rapid rate if the drying is done in a first-class kiln susceptible to close regulation of the temperature and humidity.

In connection with the seasoning of wood studies, it is worth while to refer to the kiln-drying courses given during the spring of 1922 at Eureka and Susanville, by laboratory representatives in cooperation with the district office of the Forest Service at San Francisco, the California Redwood Manufacturers' Association, the California White and Sugar Pine Manufacturers Association, the Holmes Eureka Lumber Company, and the Fruit Growers' Supply Company. Thirty men registered for these courses, in which instruction was given concerning the kiln-drying of local species. Although similar courses have been given to more than 300 men from all parts of the United States, this was the first time the courses were presented elsewhere than at Madison.

Of the half million strength tests made at the laboratory, a large number were on California species. At this time tests are under way which will determine the strength as a column of both green and seasoned Douglas fir timbers.

Decay in wood produces a loss which is far greater than that caused annually by fire, although, partly because it is not spectacular, far less attention has been paid to this form of waste. A present phase of the work of protecting timber against decay through preservative treatment is the assistance offered to California mine operators.

Although apparently economic conditions are not yet ripe for the extensive manufacture of paper in California, pulping tests on the woods of the state show that various grades of paper can satisfactorily be made from a number of species; and when the period for active development arrives, much information of value will be available.

California's huge fruit industry and the consequent need for packing material create an increasing demand at the laboratory for advice in the construction of boxes and crates. Fortunately, a great deal of information on this subject is already available through tests, many of which were made on California species.

A study which has created much interest in the conversion of sawdust through chemical action into a stock food, which has been found in actual feeding experiments made for short periods to have high food value, although the practical commercial development must await the conclusion of long-time tests now being carried on in cooperation with the Bureau of Animal Industry. Recent experiments have shown that the yield of convertible sugars can be increased 25 per cent, and it seems logical to look forward to further advancement. This increase in sugar is valuable also in the development of larger yields of ethyl alcohol, which may some day be one of the substitutes for present motor fuels. It has been found that 20 gallons of 95 per cent alcohol can be produced from one ton of sugar pine and that $23\frac{1}{2}$ gallons of the same quality can be obtained from an equal amount of Douglas fir.

It is not only the reduction of waste in species now being extensively logged in which the laboratory is concerned. Other work deals with species of supposedly low commercial value, but often forming a good proportion of the stand in the various timbered regions. Among the more important of these in California are red fir (*Abies magnifica*), white fir (*Abies concolor*), lodgepole pine (*Pinus contorta*) and tan oak (*Quercus densiflora*); a half-dozen other species, such as Oregon myrtle (*Umbellularia californica*), of secondary importance, could also be added.

The objects of the Forest Service in promoting the use of these species through a better knowledge of their properties and the uses to which they may be put, are to reduce the drain on the fast-diminishing species and distribute it among other suitable species, to effect closer and more complete woods' utilization, to decrease waste in the production of by-products now unsaleable occurring in milling and manufacturing, and to foster the practice of forestry. Commercial uses of woods will be developed, in most cases, only when cooperation with lumber associations or other interested organizations is made available.

Work on this project will progress slowly, because of limited funds and the great number of little-used species in the United States; however, several species in California have been selected for immediate study.

The Forest Products Laboratory has dealt with other problems peculiar to California species and local conditions, but not all of these can be presented. There is available at the Madison laboratory and at the products office of the Forest Service, at San Francisco, a great fund of information on wood, obtained through tests and experiments, which is freely available to anyone interested.

CALIFORNIA FORESTRY COMMITTEE.

The California Forestry Committee was formed in the early spring of 1920, the personnel consisting of a representative each from the U. S. Forest Service, the State Forester's office, the California White and Sugar Pine Manufacturers Association, the Central Pacific Railway Company and the Division of Forestry of the University of California. The original purpose of this committee was to investigate the merits and demerits of the "light burning" theory which was causing a lively discussion.

From its inception the committee found that the "light burning" theory was not a simple nor a single idea, and that no conclusive information concerning it was available. It was decided, therefore, to conduct a practical experiment in "light burning" on some particular area. The area selected was on Moffett Creek, Siskiyou County, a few miles south of Yreka. Early in July, 1920, a forest fire had burned over an area of about fifteen sections in this vicinity, a considerable portion of which was owned by the Central Pacific Railway Company.

On October 2, 1920, Mr. B. A. McAllaster, land commissioner of the Central Pacific Railway Company, inspected this burned area, and the manner in which the fire affected the timber on certain portions of the area led him, on January 5, 1921, to write a letter to the California Forestry Committee, suggesting that the timbered portions of the Moffett Creek watershed, comprising an area of aproximately 16,450 acres, would be an ideal place for the committee to initiate and carry on some light-burning experiments of its own. The committee adopted his suggestions and the consent of all the landowners within the area to be burned was obtained. Several weeks during the late spring were spent in trying to find conditions neither too dry to be dangerous nor too wet to make the expense of the operation prohibitive. Such a condition was not found.

The lack of definite results in 1921 led to a change of methods on the part of the committee and in the spring of 1922, the carrying on of the burning experiment in Moffett Creek was placed under the direct supervision of the State Forester, with the understanding that the U. S. Forest Service was to contribute help in checking up on the technical observations of the work. Assistant State Forester Rider supervised the field operations and Forest Examiner Munns had charge of the technical observations. The other members of the party were Forest Examiners Show and Dunning, and Forest Assistant Barnum of the U. S. Forest Service, and State Rangers Powers and Henry.

After spending some time checking up on the burn of 1920, it was decided to attempt to re-burn about 160 acres on the south side of Moffett Creek. Additional help was secured and a fire line built around an area of approximately 100 acres. A 100 per cent cruise was made of this area, both of the living timber and of the standing and down dead timber and data was taken of all the fire scars on the living trees. Severe thunder storms, followed by cloudy weather, prevented the burning of this area, so on June 12, another area of approximately 10 acres on an eastern slope adjoining this area was laid

out and burned, but owing to the damp condition, definite results were not obtainable. On June 13, five acres on the north slope of Moffett Creek was burned in the same manner, burning only being accomplished by spot firing. On June 13 and 14 the California Forestry Committee visited camp and after witnessing several unsatisfactory attempts to burn the areas already laid out, decided to attempt a down hill burn on an additional area on a west slope. It was decided that following this burn, the results should be checked about the middle of September, when an attempt would be made to re-burn these areas. It was also decided to lay out and burn additional areas so that a check could be made of those burned in the spring, it being the idea of some of the members of the committee that a fall burn would be less destructive to young growth.

As to the result of these decisions, an area of approximately 12 acres, just east and adjoining the camp site, was laid out and a fire line constructed around it. On June 16, at 5 a. m., this area was fired at the point of highest elevation and allowed to burn down hill the entire day and part of the following night and by 3 a. m., June 17, the entire areas was burned over. In a few instances, burning cones or parts of burning logs rolled down the steep slopes, setting fire at the bottom, causing fire to run up hill. About 5 per cent of the area was burned in this manner, this burning being mostly on the extreme ends of the area, where it was much narrower than in the middle. On the morning of June 17, the fire was all dead, except for smoldering logs and snags. The fire was controlled at all times and burned very slowly, except in two cases, where fire from rolling material as mentioned, started a fire up hill, and the fire by creating a heavy draft, burned fiercely until it reached the fire line. The ground was very moist and the lower layers of litter and humus were so damp that conditions for light burning were as ideal as could be found. The north slopes burned much slower than the south slopes, owing to heavy litter and more moisture. In places, it was noted that the fire burned slowly down hill, consuming the top litter and apparently drying out the bottom layer. The bottom layer would then ignite, creating an up hill fire, which occasionally would cause a crown fire through brush and reproduction.

The month of September, 1922, witnessed one of the most severe forest fire conditions known in California and until September 30, every man in the employ of the State Board of Forestry was more than busy in handling the fire situation. This condition was terminated abruptly on October 2, by a heavy rain, the weather bureau records at Yreka showing that .45 of an inch of rain fell on October 2 and .34 of an inch on October 3, the temperature dropping from a maximum of 74 degrees on September 30 to a maximum of 55 degrees on October 1. Believing, however, that the rain would be followed by a dry spell that would make light burning possible, attempts were made to burn at different times from October 6 to October 19.

On October 16, Munns and Powers made a 100 per cent cruise of the area burned on June 16 to determine the amount of timber killed. This cruise showed that six yellow pines and four Douglas firs had been burned down, while four yellow pines and three Douglas firs had been killed standing, making a total loss of seventeen trees. These trees

varied in size from 12 inches to 36 inches, their volume being 5470 board feet for the down and 3710 board feet for the standing trees or a total of 9810 board feet for the 12 acres, an average of 765 feet per acre. This cruise showed 98 per cent of the area burned, the 2 per cent unburned being on a steep hillside covered with rock out-crop and free from litter.

In addition to cruising the large timber, Munns and Powers made an examination of a strip 26 chains long and 6½ feet wide, which had been laid out as a check strip before the area was fired in June. At the time this strip was laid out a careful count was made of all trees upon it, from six inch high seedlings to saplings six inches in diameter, and it was found to contain 737 trees, 494 of which were yellow pine, 209 cedar and the balance sugar pine, Douglas fir and Juniper. On October 16, there was found to be only 43 trees living out of the original 737 on the strip before the burning and 22 of the 43 living trees had received sufficient injury to place them in the doubtful class. Probably 11 of these 22 will not survive, this leaving only 32 trees. Of the 43 trees left on the area at the time of the examination, only two were under three feet in height, showing that only the larger trees escaped the fire.

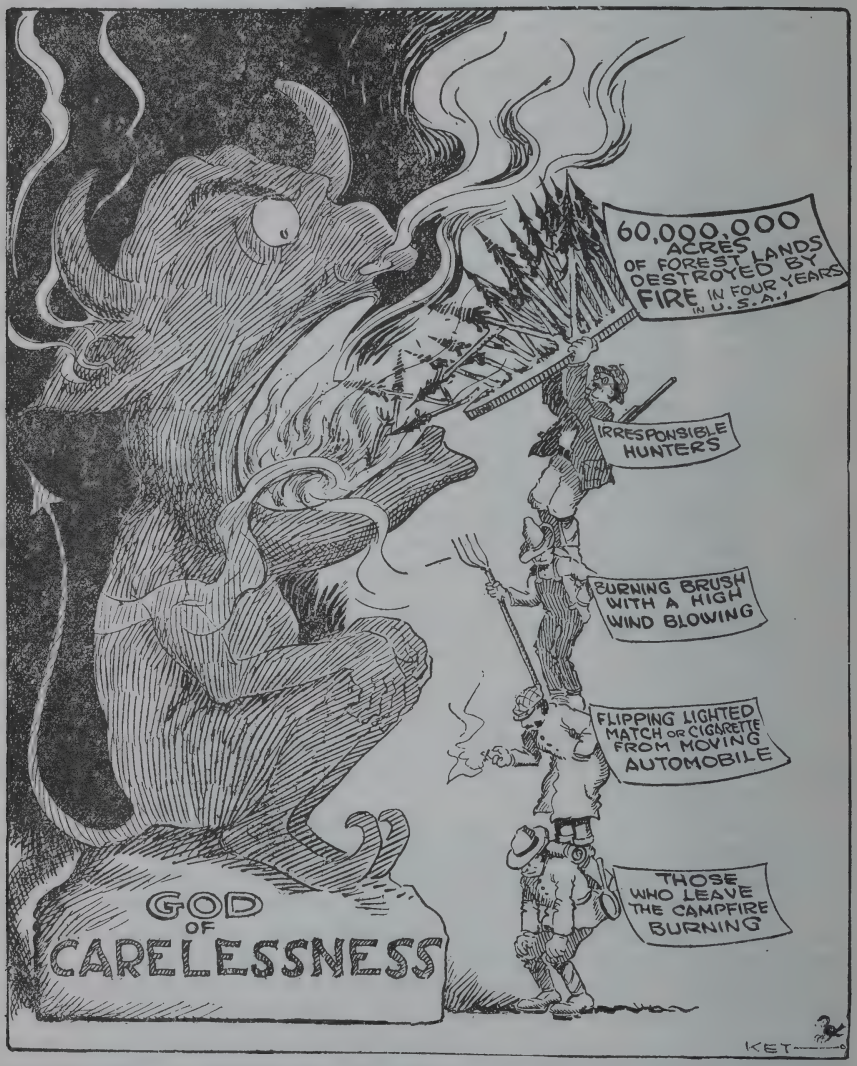
On October 18, Munns, Powers and Rider again visited Moffett Creek and attempted to burn. A portion of the burn of 1920 on the right hand side of the creek opposite the old camp was first tried. Here the upper layer of fresh pine needles burned slowly as long as the burning was in the sunlight, but as soon as the blaze reached a shady spot it went out. Burning was then tried at the mouth of Sissel Gulch, where the Committee had burned a small area in 1920. The top surface of pine needles here burned more freely, but the lower layers of litter would not ignite. A small patch of reproduction was next fired at the mouth of Sissell Gulch, directly opposite, with the same results, except that it was noted that where even this extremely light fire came in contact with a small fir tree, with branches reaching clear to the ground, that it quickly ran up the tree, completely defoliating it. It may be possible to note next spring if the heat from this light fire had any effect on the pine reproduction through which it ran.

At the time of the visit on October 18, to Moffett Creek, an apparent increase of insect infestation on the area burned by the fire of 1920, was noted and a sugar pine 30 inches in diameter on the area burned on June 16, was found to be infested.

The conclusions of this and previous seasons, which substantially confirm the results and conclusions announced by the Forest Service in 1919, are as follows:

(1) Spring burning is dangerous because by the time the litter is sufficiently dry to burn satisfactorily the season is normally far advanced. No more rains can be counted on and smoldering logs and snags may hold fire well on into the fire season; (2) Summer burning can be kept under control, but apparently only at an expense out of proportion to the benefits obtained; (3) Fall burning is often impracticable, because while vegetation dries out slowly it may become saturated with water in a few hours. Not infrequently the most critical period of the fire season is terminated by heavy rains, after which the ground never again becomes dry enough for burning. This condition

may not be universal, but it seems sufficiently frequent to make fall burning impracticable as a generally applicable plan; (4) At any season the cost of light burning appears considerably greater than the benefits resulting; (5) Downhill burning is decidedly preferable to uphill burning, but it sems impracticable to avoid some uphill burning on large experiments and even downhill fires are not free from damage; (6) No burn yet observed failed to damage seriously reproduction. This statement includes downhill fires and second fires on lands burned off previously within two years; (7) No burn yet studied critically failed to cause damage to mature timber which was considerably larger than would be apparent to a casual observer; (8) Under conditions where light burning is at all practicable it is unnecessary,


60,000,000 ACRES OF FOREST LANDS DESTROYED BY FIRE IN FOUR YEARS IN U.S.A.
IRRESPONSIBLE HUNTERS
BURNING BRUSH WITH A HIGH WIND BLOWING
FLIPPING LIGHTED MATCH OR CIGARETTE FROM MOVING AUTOMOBILE
THOSE WHO LEAVE THE CAMPFIRE BURNING
GOD OF CARELESSNESS
KET

How long will the people of California continue to feed this Moloch?
(Cartoon From Oakland Tribune)

since under such conditions protection by the ordinary methods is easy and far less expensive; (9) Under conditions where light burning seems most necessary, it is too dangerous to be practicable; (10) Light burning on large areas at one time is impossible, because the moisture conditions on slopes of different direction vary widely.

After three years of work the committee has not been able to find or to devise a fire-protective system based upon the light-burning theory which seems more practicable and economical than that already in effect on the National Forests. At a meeting held January 5, 1923, it was therefore unanimously voted to discontinue this experiment.

STATE FIRE ORGANIZATION.

The expansion of the state fire organization from four district fire rangers in 1919, when funds first became available for fire-protection work, to 27 rangers and lookout men in 1922, was brought about through the demands of the people of California for better fire protection and their willingness to cooperate with the State Board of Forestry in a financial way.

The present state fire organization would have been impossible had it been necessary to depend wholly on the appropriation of $37,500 a year, made by the state for fire prevention. Because of this appropriation, however, financial assistance to the extent of $22,750 was obtained from the federal government under the terms of the Weeks Law, whereby funds are available for the protection of the watersheds of navigable streams in states which make appropriations for forest protection. In addition, cooperative moneys to the extent of over $17,000 were made available by counties and private agencies cooperating with the state in fire-prevention work.

The fire organization for the season of 1922 was as follows:

District Fire Rangers.

District.	Name.	Headquarters.
Berkeley and Contra Costa Hills	E. F. Barnes	Oakland
Butte County	C. C. Turner	Oroville
Colusa County	G. H. Leverett	Arbuckle
Eldorado and Amador Counties	George Park	Placerville
Glenn County	Glenn Gadbury	Willows
Lake County	F. L. Woodruff	Upper Lake
Mendocino County	R. E. Roach	Willits
	E. P. Biggs	Fort Bragg
Nevada County	W. F. Sharp	Nevada City
Placer County	J. E. Watts	Colfax
Riverside County	F. M. Baird	Corona
Sacramento County	J. P. Yost	Sacramento
San Bernardino County	P. Q. Harvey	San Bernardino
San Joaquin County	George Locke	Lockeford
San Luis Obispo County	J. A. Reid	Paso Robles
Santa Cruz and Santa Clara Counties	A. H. Oswald	Cupertino
Shasta County	L. E. Peterson	Redding
	G. I. Gillette	Viola
Siskiyou, Moffett Creek Area	C. H. Henry	Fort Jones
Tehama County	Andrew Schafer	Red Bluff
Tuolumne County	L. H. Holland	Sonora

Inspectors.

District Fire Rangers: A. E. Frost, O. E. Fowler.
Slash Disposal: R. E. Doney, Harry Powers.

Lookouts.

Mount Oso, Ed. Sherman; Mount Bielawski, Almon E. Smead.

FIRE SEASON OF 1922.

Until September 1st comparatively little of the fire appropriation was spent except for salaries and expenses of rangers and lookouts. Coincident with the opening of the hunting season, fires started up all over the state. From that time until the latter part of September, most of the rangers were continually on the fire line, snatching a few hours' sleep as they could. The loss of timber, range and improvements was large, but had it not been for the remarkable efforts put forth by the state and federal rangers, there would in all probability have been conflagrations in California which would have destroyed property valued at many millions of dollars. The State Board of Forestry highly commends the rangers who struggled against such overwhelming odds. The following newspaper clippings tell the fire story of the past season better than mere figures of acreage burned over and money loss sustained:

Oakland Tribune: Once more the trail of the camper has been hidden by smoke, the season of excursions into the forests has been made one of devastating fires. Earlier than usual and despite the warnings, appeals and threats, the stories come in of men who leave their camp-fires burning and of others who toss the lighted cigarette or cigar into the brush.

There is an abundant undergrowth this year, the clearings in the forest are covered with dry grass and brittle weeds. Never was the danger any greater. For those who are inclined to be careless, and as an assurance that a lesson is, at last, to be carried home, it may be said the forest guardians have increased their forces and efficiency in matter of detecting the offenders. Arrest is followed by punishment, swift and effective. The man who leaves so much as a single glowing ember on a camp scene he is about to desert is taking the chance of a jail sentence and heavy fine.

Visalia Times: Of course, it becomes wearying to the constant reader of newspapers to be confronted so often about this time of the year with warnings and cautious and local and editorial matter urging carefulness with fire in camping localities and elsewhere; but it is no more tiring to the reader than it is to the fellow who feels it incumbent upon himself to write such stuff.

The writer watched, at times for a period covering ten days, in the southern part of the state, the destruction of 75 square miles of timber and underbrush, to the great and apparently irreparable damage to the watershed of that portion of the San Bernardino Mountains supplying several counties with water for domestic and for irrigation use. It is a pitiable sight and one that generally might be avoided, to peer through night after night at the blazing pines on the distant mountain sides, to sniff the expensive smoke miles away, and later to traverse the blackened, fire-denuded areas of the upper altitudes that erstwhile attracted, collected, and distributed equitably for life-giving moisture to the sun-kissed valleys below, and to ruminate on the diminishing effect of such fires—practically all preventable with application of common sense and care and thoughtfulness—are certain to have upon the water supply.

The scattered and charred trunks of trees here and there remaining on the scene of outraged Nature are monuments to man's recklessness, his disinclination to help save the blessings that have been freely bestowed upon him by Providence. And not only does the forest in the upper reaches of this country drive a shattering blow at irrigation and domestic water supply; but denudation of those slopes of trees and underbrush and grasses also removes Nature's barrier against floods that would rush destructively down into the rich valleys below.

Yes, it's an old story—"Be careful of fire," "Help save the forests," etc., but each succeeding year—although signs now and then appear that strict and stricter laws, better enforcement and closer and more systematic guarding are somewhat lessening the carelessness-produced fire losses—it must be told and iterated and reiterated, woven into public speech and worked into an anthem; with ever-retained patience like that needed in the training of a child, with "precept upon precept, and line upon line."

Stockton Record: It is doubtful if, even with constant repetition, the people and especially those responsible for forest fires, realize how much in dollars and cents these annual conflagrations cost. The destruction of forests, stock and pasturage is almost inestimable. But when told that it cost the government $20,000 to

fight the flames in the California National Forest this year, one of the most serious forest fires in Northern California in a quarter of a century, figures begin to talk.

Five hundred men under the direction of forest rangers fought the roaring flames ten days. One hundred men are still guarding the smouldering ruins in places and the fire can not be considered wholly out until rains come. The flames wrought their havoc on an area of forty by fifty miles, taking everything in their way. In addition to the money cost, there is the tremendous expenditure of human energy, the risk to life of those fighting flames surrounded by terrific heat, besides the danger to all life in the path of the fire.

When one considers how frequent are these devastating holocausts of the woods, the wonder is to the summer visitor that there is as much verdure left in the mountains as there is.

One thing is certain, if a single individual owned city or country property worth as much as these forests, he would be terribly careful in everything he did not to start a fire that would cost him $20,000 for 500 fighters who must work several weeks to quench the flames without saving anything. And if this thing happened every year, without insurance he would shortly be a bankrupt. Yet that multiplied many times is exactly what happens to the state of California, and to the national government, which means that irresponsible persons set the fires on their own property and that all of us have to pay for putting them out.

Ukiah Republican Press: One of the worst conflagrations that ever visited Ukiah called out the entire populace of the town last Wednesday when burning pine cones from the back fire set by the fire wardens Tuesday evening, fell in the southern outskirts of the city completely wiping out the farm buildings on the Gobbi ranch as well as all of the fencing in the path of the flames. The ranch as it stands desolated today is stripped of every sign of human habitation, not a stick of fencing or a wall remaining after the ravages of the fire which laid low the Gobbi residence, a small prune dryer and several hundred trays, a small winery adjoining the house, woodsheds and the big winery leased to the California Grape Products Company and filled with 30,000 grape boxes and several thousand dollars worth of farm machinery and huge wine tanks. From the Gobbi property the flames leaped across the street to the residence of Mr. and Mrs. Wm. H. Sharpe from which the occupants escaped with only the clothes they wore. At the same time flames burst from a barn on the Hughes property and another barn at the home of Ira Fisher caught fire. Both were consumed with their contents, which in the Fisher case included about five tons of hay, some garden implements and several dozen chickens.

By this time the entire business section of the city was closed and men, women and children aided in fighting the flames with wet sacks. The Ukiah fire department stood by until late into the night, giving valuable aid. During the intense heat of the fire, flames burst out in many sections of the district but were promptly subdued by vigilant watchers. At the home of Charles Kasch the flames crept almost to the very door, and the fencing at the home of Judge Preston, across the street, caught fire repeatedly, while roofs and dry areas covered with grass were in flames many times from the burning cinders and cones. A shift in the wind from the west to the southwest is all that saved that section of the city from total destruction. No estimate has been made of the damage but it is known it will run into many thousands of dollars. A pathetic incident in connection with the fire was the partial destruction of the bicycles of three boy scouts, Thomas Anker, and Jack and Wakefield Taylor, who left their wheels in what they considered comparative safety, while they aided in fighting the fire. When they returned the whole area was in flames and the bicycles badly burned.

In spite of the intense heat there were no prostrations. A. Perelli-Minnetti estimated the loss to the California Grape Products Company at $15,000. The fire is still burning to the south of the city where it menaced many ranches the last of the week. The roar of the flames could be heard day and night and, coupled with the intense heat and the heavy smoke curtain, created a scene of the utmost depression. While it is hard to get reports of the damage to the hill residents, it is known that the Evans ranch on Pine Ridge, recently sold to a family whose names could not be learned, had been wiped out. The new owners had completely refurnished the ranch and lost everything. It is expected many more catastrophes will be reported when the fire has subsided.

San Luis Obispo Tribune: That many deer and hundreds of quail and doves have been literally roasted alive by the fire raging in the Santa Margarita section, was the report of Augustin Estudillo, who was in town yesterday from his ranch near Santa Margarita.

Mr. Estudillo's ranch was completely circled by the fire, but hard work on the part of the fire fighters saved the place.

He had occasion to walk near the fire line the other day and found a young fawn which had been terribly burned by the flames. He picked the little creature up and dressed its burns, but it did not survive.

He states that hundreds of quail have been caught in between two branches of the fire, and in flying over the flames in an effort to escape have been burned to death. Many doves have also been burned to death, and several deer are known to have perished.

Placerville Mountain Democrat: The fire that started on the Butler place, near El Dorado, was practically extinguished after ending on the S. O. ranch, says the correspondent to the Bee.

A barn on the E. A. Bowker ranch was saved by the heroic efforts of Supervisor W. S. Biggs and crew of men, by tearing the burning shakes from the roof. The barn was full of hay. Another barn and stable were burned. A house occupied by Tim Franklin on the J. I. Martin farm, caught fire nine times, but was finally saved.

Only by back-firing was the town of El Dorado saved from being wiped out. The Western States Gas and Electric power line was guarded by their own employees, who early learned of the conflagration by phone, and the fire was kept from the Company's high tension power line by a narrow margin. Every able-bodied man, under Fire Warden Roy M. Marks, James Davidson, and Supervisor Biggs, fought like demons.

Many women helped, giving drinks and refreshments to the fighters. About 2,000 acres were burned over and a lot of dry feed destroyed. Those burned over were the Butler, J. C. Forni, A. E. Bowker, Joseph Windle and S. C. Dunlap, J. J. Martin and Roy ranches.

Fresno Republican: The fire which started Sunday noon near Terra Loma and burned over an area of 10,000 acres, including 320 acres of grain, was the worst in ten years, according to ranchers who returned from the district today.

Three hundred and twenty acres was in grain which was to be used as feed, while the remainder was alfilaria grass, which is very valuable to the cattlemen. C. F. Fuller says it was worth five dollars an acre as feed. It is seven years since the feed has been good on the plains. This year it was very heavy, averaging over two feet deep.

When the fire started in this deep grass it developed intense heat and drove the fighters back. The wind changed directions several times, surrounding the fighters and endangering their lives. They became separated in the darkness and heavy smoke and several times were in grave danger. Lack of drinking water increased their hardships.

The only method of fighting was with shovels and loose dirt. Wet barley sacks only served to spread the flames, which would frequently jump one hundred feet at a time. When daylight came a tractor was used to plow a fire guard and then back-firing was needed. The wind changed in the forenoon and the fire spread back into the hills where it is still burning.

Among those who were heavy losers were: C. F. Fuller, who lost 3320 acres; Pete Bardeau, 3000 acres; Elsworthy and Goni, 1920 acres; O. Johns, 320 acres; John Jones, 320 acres.

The Terra Loma schoolhouse was in danger at one time, but was saved by the fighters. However, the school shed was burned. Several homesteaders' houses were burned.

Sacramento Bee: Ranchers in this vicinity were endeavoring today to check up their losses in one of the most disastrous grain-field fires in the history of the county, which yesterday burned for ten hours over an area nine miles long and approximately one mile wide. A huge charred expanse of ashes remained today where there were acres of golden grain or piles of sacked wheat.

The fire started shortly before noon yesterday on the Feeney ranch, eight miles west of here. Back-fire from a motor truck is believed responsible. There was only stubble on the Feeney ranch, but the crackling fire swept over the ground swiftly to other properties where there was standing grain.

Over the O'Brien, Gurry, French, Payton Bros., Prentice, Brunnell, McDaniel, Compton and Green ranches the flames coursed, resisting all efforts to check it until it struck the Marshall ranch, where it was extinguished at 9 o'clock last night, after hundreds of men had gathered to head it off.

District Fire Ranger Glenn Gadbury, who assumed charge of the fire fighting, came to Willows at sundown to obtain every possible man to assist. Many joined the army of ranchers that had been battling the blaze through the afternoon.

Miles of fences were destroyed by the fire. The heaviest individual loser is believed to be Fred Mason of Willows, who leased the Gurry French place. He

had 200 acres of standing wheat, 300 acres of barley, 1,500 bags of threshed wheat, an oil wagon and a tank in the path of the flames, all destroyed. Payton Brothers lost 300 acres of uncut grain. Others had not estimated their loss as yet.

Sacramento Bee: After a night without electric lights, Yreka and other Siskiyou County towns today faced the prospect of another night in darkness, as word reached here that the brush fire which yesterday cut the power line of the California-Oregon Power Company, is menacing the temporary line erected by the concern today.

Sweeping through the hills at the rate of a mile an hour, the fire is declared beyond control and the fire fighters being rushed to the scene by the power concern and the Sheriff of Siskiyou County are directing their efforts toward the widening of the path of the flames. Shortly before noon today sparks from the original blaze started a second fire some distance away, and this had the effect of dividing the force of fire fighters. Responsibility for the fire is being placed on a group of Southern Pacific section hands who were burning old railroad ties yesterday afternoon near Charall. The burning ties ignited dry grass at about 5.30 o'clock and the flames quickly swept up the slope of the foothills of Black Mountain, finding ready fuel in the dry brush. Poles of the California-Oregon Power Company's lines were in the path of the fire and these were destroyed for a distance of a mile and a half, cutting off the electricity supply in this vicinity.

Reports today were that the fire had already covered seven miles and was still sweeping in a northwesterly direction toward the Copco Dam in the Ager Basin. Lines of the Pacific Telephone and Telegraph Company are endangered.

No houses or cattle are in the path of the blaze and beyond the destruction of the power and telephone lines, there is not likely to be any property damage. There is also no timber in the neighborhood of the blaze. One hundred men were at the scene of the fire this morning. The pall of smoke from the fire partly obscured the sun.

Ventura Post: Burned while helping to fight fire on the Cuesta grade above San Luis Obispo, James Gerhard, formerly a clerk in the De Leon Hotel, lies at the point of death at San Luis.

Gerhard, in company with a group of other young men, went out on the grade where a fierce brush fire was raging and attempted to battle with the flames. The men were driven back and all of them gave up the unequal fight with the exception of Gerhard, who made an attempt to get to some rangers working a distance away. He found himself entirely surrounded by fire and became panicy for a time, rushing to break out of the ring of fire around him. He was caught in the flames and his face and body badly burned.

He was rescued nearly unconscious by other fire fighters and was taken to the nearest medical aid.

Gerhard was employed in the DeLeon hotel as a clerk about ten years ago.

Los Angeles Times: A survey completed yesterday by Supervisor Charlton shows that more than 500 men, all active firefighters, were engaged in the job of extinguishing the flames that started in the rear of the hospital, at the Arrowhead Hotel, in the Federal forest reserve a few days ago. The cost to the government will be more than $25,000 for help alone.

There were eighteen sections of land burned over, or 11,520 acres. In addition some of the best timber on the local reserve, especially that on the Rim of the World drive, was destroyed. The money loss from that source cannot be computed at this time.

Leaving the Arrowhead Hospital the fire ate its way toward City Creek, thence to lower Waterman Canyon, and from there to the 101-mile drive at the Rim of the World, when it jumped to Allison's ranch, then to the north side of the mountains to Hook Creek. The blaze did not reach Little Bear Valley.

In spite of the hundreds of men on the fire line the blaze was making steady progress until the coming of the rain, followed later by two inches of snow, covering the entire region. The fire was the only one of any consequence during the entire season.

A most effective piece of cooperative fire protection work was carried out the past summer in the Contra Costa Hills, where there are some of the most extensive and important forest plantations in the country. These plantations are extremely important from a watershed standpoint, since the water which supplies the east bay cities largely comes from the area which they cover. The character of the protective system which was installed under the general direction of the State Forester is described in the following article:

Planted forest on the Contra Costa Hills, from which water is stored for the East Bay cities at their feet.

Planted forest near Redwood Canyon, Contra Costa Hills, which is being protected from fire by the state fire organization.

THE CONTRA COSTA HILLS FIRE PREVENTION.

By Paul I. Daniels, Land Agent, East Bay Water Company.

Not more than fifteen years ago the hills lying along the easterly portions of the cities of Oakland and Berkeley were not as now covered with groves of forest trees, but were practically bare on the western slope and very sparsely dotted with oaks on the eastern side. At that time the only visible mantle to the hills was the wild grass, green and beautiful in the winter, but rather mountainous in the summer when dry and brown.

During the time previous to the planting of trees, grass fires were of common occurrence during the summer months and little heed was given the matter excepting by the people depending on the grass for cattle feed. To them the fires were a great loss then as now, many times forcing the owners of cattle to dispose of their stock at a great sacrifice owing to the feed being destroyed by fire.

During the year 1910 work was commenced on a general scheme of forest planting on Contra Costa Hills. A great amount of money and labor was expended on the project. The results are quite apparent today. It is doubtful if there is any one who has looked at the condition of the hills without the forest and now, would care to see the old condition return, yet there is always a chance that just such a thing may happen if proper precautions are not taken to guard these wooded sections from the three great destroyers of forest, namely, Fire, Disease and destructive Insects. Of the three, fire is the most destructive if not properly guarded against.

Disastrous forest fires are generally the result of carelessness on the part of some person and easily prevented by a little care and thought on the part of those traveling through the dry hills or forest. A fire once started may easily get out of control and cause irreparable damage. Pine trees badly scorched are gone forever; some other trees such as the eucalyptus may recover, but it takes a long time for them to do so.

The increasing amount of automobile and foot travel through the Contra Costa Hills over the scenic boulevards and trails has multiplied many times the danger from fire.

As a result of the fire along the Tunnel Road during the summer of 1921 when approximately two-fifths of the pine trees plantationing that section was toally destroyed, the matter of protecting these plantations on the hills was taken up in a co-operative way by the Forestry Department of the University of California, the East Bay Water Company and the City of Oakland, and the City of Berkeley, together with the cooperation of the California State Board of Forestry, with the result that a fund of $2,000 was provided, a plan formed and a preliminary organization was put in the field June 1, 1922. This organization is under the general direction of State Forester M. B. Pratt, who is in charge of fire fighting operations. From funds provided six large steel boxes equipped with tools for fire fighting were purchased. These boxes were placed at the following locations:

1—At the north end of Spruce Street in front of Summit Reservoir, East Bay Water Company.

2—In Telegraph Canyon (Claremont Canyon) about one-half mile above Claremont Hotel.

3—At the west end of Inter-County Tunnel on the Tunnel Road.

4—At Observation Point on the Skyline Boulevard between Tunnel Road and Thornhill.

5—At junction of new Skyline Boulevard extension and the Snake Road.

6—On Joaquin Miller road opposite office of Joaquin Miller Acres.

Other boxes equipped with proper tools will be added as soon as funds are available to purchase same.

The boxes contain shovels, rakes, hoes, axes, lanterns and water bags. This equipment is to be used for fire fighting purposes only. Each box is labeled "California State Board of Forestry. In Case of Fire Telephone Lakeside 585." Deputy State fire wardens have been appointed by the State Board of Forestry as shown on pages ten and eleven. Other deputy state fire wardens are to be added as the case demands.

The deputy state fire wardens take charge of all fires in their districts and have authority to requisition aid of any able bodied citizen between the ages of 18 and

50 to assist in putting out fires in any district outside of incorporated cities. Any person capable of performing such duties who refuses to comply is subject to arrest and fine.

A meeting was called on the evening of July 13, by the Contra Costa Hills Club in the Assembly Hall of the Oakland Tribune. At this meeting the matter was discussed of enlarging the organization and facilities for fire prevention. A temporary committee was appointed for the purpose of getting together those most vitally interested in the prevention of fires in the Contra Costa Hills.

On July 18, the temporary committee and representatives from various organizations, corporations and municipalities in the Eastbay district were present. At this meeting a resolution was adopted making the temporary committee, together with the representative present, a permanent committee to be known as the Contra Costa Hills Fire Protection Committee.

The interests represented at this committee meeting were as follows: The cities of Oakland, Berkeley, Albany, Alameda, and Piedmont by their fire departments; the Oakland and Berkeley park departments; the University of California by the Forestry department; the State Board of Forestry by the State Forester; the Oakland Chamber of Commerce; the Berkeley Chamber of Commerce; the Contra Costa Hills Club; the East Bay Water Company; the Oakland Traction Company; the San Francisco-Sacramento Railway; Oakland Real Estate Board; Automobile Dealers' Association; East Bay Safety Council, and the Berkeley Boy Scouts by the Scoutmaster.

At the present time there is a great need for funds to carry on the work and for the purchase of additional equipment for protecting the hills and tree plantations. The money for the purchase of the equipment to date and for the salary of the District Fire Ranger was provided by the East Bay Water Company, the City of Oakland, City of Berkeley, the University of California and California State Board of Forestry.

To properly carry on the work as planned, an additional sum of $5,000 is required. Of this sum $1,000 has been contributed up to July 24. The money collected is to be used for fire prevention and control only. No salaries or fees are to be distributed to members of the committee. Funds are to be deposited in a bank selected by the committee, such account to stand in the name of Contra Costa Hills Fire Protection Committee. All bills or expenses in connection with the prevention and control of fires in the Contra Costa Hills which may come under the direction of this committee are to be referred to the District Fire Ranger for approval of same. The signatures of two of a finance committee of five are required for the withdrawal of funds.

The importance of properly protecting the Contra Costa Hills forest areas can not be overestimated as this forest area is the largest and best plantation of its kind in the State of California and its loss would be keenly felt by all of the Eastbay community.

At the California state primary election on August 29, 1922, the City of Oakland presents the proposition of voting bonds for the purchase of some 1500 acres of the best of the forest section for the purpose of a public park by the City of Oakland. It is therefore especially important that every measure of protection be afforded the forests now and in the future so that this area may be a lasting attraction and source of enjoyment to the residents of the Eastbay districts.

For the present, build no fires in the hills. Smokers, be careful where you throw burning tobacco. Do not burn rubbish without clearing grass area around the fire. Do not burn grass off the hills without permit from fire department, and then only with some one in charge who is experienced in such matters.

"Save The Trees."

FIRE LOOKOUT STATIONS.

Mount Bielawski Lookout.

The fire lookout tower on Mount Bielawski ,the highest point on the Castle Rock ridge between Santa Clara and Santa Cruz counties, is the first structure of its kind which has been erected through the efforts of the State Board of Forestry. This 60-foot steel tower, and the 18 miles of telephone line connecting it with the California Redwood Park in Big Basin, was made possible through financial cooperation extended by Santa Cruz, Santa Clara and San Mateo counties, the State Highway Commission and the California Redwood Park Commission. There is also a connection with the Los Gatos telephone line which was made by a three-mile line built by local ranchers in co-operation with the State Board of Forestry.

The telephone line to the California Redwood Park was constructed and the lookout tower erected by state rangers under the supervision of Inspector Frost, State Board of Forestry. On July 2, 1922, the tower was dedicated. The following account of the exercises appeared in the Santa Cruz *Sentinel:*

Sunday afternoon before an assembly of about 250 people on Mount Bielawski, a new 60-foot steel tower was dedicated.

The ceremonies were simple but impressive. Mr. Sanders, the well-known public-spirited citizen of Saratoga, was master of ceremonies. There were also present a large number of people from the surrounding districts in Santa Cruz and Santa Clara counties.

At the command of Mr. Sanders, the Santa Cruz Boy Scout Troop No. 3 opened the ceremonies, Scout G. Penniman sounding the bugle call, immediately following which the flag was raised by Scout Donald Rogers, the other Scouts forming a hollow square. No sooner had Old Glory reached the new high point than Scout J. Sowder, who by then had perched himself well up in the tower, wig-wagged the following message to the people and the rest of the Scouts assembled below:

"We dedicate this tower to the conservation of our Santa Cruz forests, which we have learned to love for the beauty, the joy and the wealth they give us."

State Forester M. B. Pratt was next introduced. He made some very interesting and prophetic remarks on the usefulness of this fire lookout station system, which his office will establish in this state. This being the first one of these projects, Santa Cruz County may consider itself fortunate and honored. He explained how this tower was made possible by the co-operation of the three counties of Santa Cruz, Santa Clara and San Mateo. He praised the foresightedness of the supervisors in these three counties. Henceforth the state will assume full control of that tower, keeping there a constant guard. The tower is connected by means of a telephone line to the outside world. Mr. Smead, a local resident, will act as guard. Mr. Pratt made special mention of the generosity of Mrs. Smead, who turned over to the state a 99-year lease at $1 per year to over an acre of ground.

State Senator Jones followed, giving a very interesting review of the history of the conservation movement in the Santa Cruz Mountains. How the necessary appropriations were secured from the state for what was up to last year the only state-owned park. Mr. Jones made the interesting remark that within 50 miles of this state redwood park was found one-third the population of the state. This valuable asset, he stated, is worthy of the best care that could be bestowed upon it.

Chairman Rostrom of the Santa Cruz board of supervisors expressed his warm appreciation over what had been done. He mentioned the fact that in previous years it had always been very difficult to secure exact information as to the location of fires; that this system just established would undoubtedly give some much needed information and would therefore be a valuable asset.

Mount Oso Lookout.

The Mount Oso Lookout was established in July, 1921, to render assistance to the Stockmen's Protective Association of Alameda and San Joaquin counties in the more efficient protection of stock range from fire. It is located on a commanding peak near the junction of Alameda, Santa Clara and Stanislaus counties, and overlooks approximately three million acres. Connections were made with the main telephone line at Westley by the construction of a 12½-mile telephone line. Cooperative funds for this project were obtained from Alameda, Santa Clara and Stanislaus counties, and considerable labor and material for the lookout tower were contributed by the Stockmen's Protective Association. Following is an account of the fire protection activities of this association the past year by Mr. John J. Callaghan, secretary:

It pleases me to state that the area burned over by field fires in Alameda and San Joaquin counties in 1922 was less than that of any year since the association was organized on May 4, 1904, although population and fire-burning devices have increased greatly. We especially appreciate the cooperation of the State Forester and his predecessors in office for their friendly advice and assistance. Other agencies have assisted, as I will outline now.

Among these are the boards of supervisors of Alameda, San Joaquin and Santa Clara counties, who at different times appointed patrolmen paid by the county and generally nominated by the association. The last mentioned county on June 5 last, on our petition, appointed mounted fire patrolmen for the Mount Hamilton and Gilroy mountain district following the plan now in force in Alameda and San Joaquin counties. Battery C, 143d Field Artillery, National Guard of California, with mount station at Livermore, many of whose members belong to the Alameda County Fire Patrol Station at Livermore, through its officers has tendered us the use of men and equipment in cases of emergency, but the most valuable assistance, to my mind, is rendered by the lookout stations on Crane Ridge, 25 miles southwest of Livermore, and on Mount Oso, Stanislaus County, the former at an elevation of 2500 feet, the latter 3383 feet above sea level.

Mount Oso Station was installed by the State Board of Forestry, in the summer of 1921, under the direction of Inspector A. E. Frost of the State Forestry Service. It is connected by telephone with Westley in San Joaquin Valley and other exchanges so that fire warnings may be sent to any quarter needed. I believe that a similar equipment on Mount Diablo, and Mount Tamalpais, together with the splendid station at Lick Observatory on Mount Hamilton, would complete a very efficient signal system covering most of central California, and occasion may arise that, in time, it may become part of the national defense. From personal knowledge I can say that the State Board of Forestry and the State Forester's office made considerable sacrifice in establishing this lookout under serious difficulties, both of climate and labor, and the station should be supported in every respect by the farmer and stockmen of surrounding counties.

Sign along state highway from Los Gatos to Santa Cruz which reads, "Due to carelessness, this area devastated by fire last year. Help protect your state from fire. California State Board of Forestry."

Tool box on Tunnel Road, Alameda County, which was a factor in keeping down fires last summer in the plantations in the Contra Costa Hills.

SPECIAL FIRE APPROPRIATIONS.

A number of special fire appropriations for the biennial period were made by the last legislature for the protection of watershed areas, the funds appropriated to be spent under the direction of the State Forester. These appropriations were made contingent upon equal amounts being expended by various agencies such as fruit exchanges and water companies which derive the direct benefit of such protection.

SAN BERNARDINO MOUNTAINS—$5,000.

This appropriation is being handled through the Supervisor of the Angeles National Forest. The San Bernardino Mountains are fairly easy of access by a large population which comes to a large extent from Los Angeles. The brush cover is exceedingly heavy and the fire danger great. The water coming from these mountains is perhaps the most intensively used of any water in the state. It is not only used in San Bernardino County, where the mountains are located, but also in Riverside and Orange counties. The great need of this region is for trails and the state appropriation is being spent chiefly for that purpose. In 1921 the state funds were used to construct 8.5 miles of new trails, repair 40.9 miles of old trails, clear two acres for camp sites, develop two springs, construct five concrete fireplaces, and build eight camp tables with benches attached.

SAN GABRIEL CANYON—$1,400.

This appropriation was handled by the Supervisor of the Angeles National Forest, who used it to employ a patrolman, to construct 1.5 miles of new trails and repair 33.4 miles of old trails. In the San Bernardino Mountains much trail repair work was necessary, since the heavy rains of the previous winter caused much gullying, and in some places landslides had completely blocked them. This necessitated the upkeep of the main traveled trails, which are all-important as a means of travel and communication during times of fire.

SAN DIMAS CANYON—$3,000.

With this appropriation, a patrolman for the canyon was employed by the Supervisor of the Angeles National Forest, six latrines constructed for the San Dimas Canyon camps, 1.3 miles of new trails constructed, and 10.9 miles of old trails repaired. The water supply from this canyon is very valuable, and is intensively used by the San Dimas citrus region.

SAN ANTONIO CANYON—$5,000.

The Supervisor of the Angeles National Forest used this appropriation to employ a patrolman for the canyon, construct 3.3 miles of new trails, repair 14.4 miles of old trails, repair Baldy Lookout house and clean up San Antonio Canyon public camp.

LOS ANGELES COUNTY—$20,000.

This appropriation is being handled through Mr. Stuart J. Flintham, County Forester, who made the following report on the work done with state and county funds for the fiscal year 1921-1922:

North Tuna Canyon firebreak,	8.75 miles	$3,652 44
South Tuna Canyon firebreak,	3.17 miles	1,775 38
Verdugo Peak firebreak	.70 miles	190 51
Verdugo Hills trails	2.62 miles	454 63
Dry Canyon firebreak	5.37 miles	2,156 62
Calabasas Peak firebreak	3.00 miles	1,493 00
Saddle Peak firebreak	5.25 miles	3,725 49
Malibu Range trails	1.62 miles	196 50
Santa Monica Mountains firebreak, maintenance		414 00
Administration		1,722 88
Tools, equipment, etc.		235 38
Outfit		1,108 28
Cook house		1,947 08
Camp expense		926 94
Total cost		$19,999 13

The firebreak and trail work done in Los Angeles County is but one phase of the work being done through the county forester. A splendid example of what can be done by a county forestry organization is given in the following report by County Forester Flintham, for the fiscal year 1921-22, to the board of supervisors of Los Angeles County:

The Forestry department is charged with the forest and conservation interests and with fire and game protection in Los Angeles County, the County Forester holding appointments also as county fire warden and county game warden.

It is the duty of this department to establish, maintain and protect shade and ornamental trees along the public roads and highways and trimming of roadside trees is undertaken to improve highway tree growth. More than 7500 trees have been trimmed by the department along county roads during the past fiscal year. All cutting, trimming or removal of roadside trees by property owners or public service corporations is under regulation through application and permit. More than 200 miles of uniform roadside tree planting has been established and is under continued care and maintenance.

The department develops and maintains county parks and the grounds around county institutions, the most extensive of which is at the Olive View Sanatorium. Here the grounds have been laid out and developed with planting of lawns, trees and shrubbery, and more than 10,000 trees a year are being planted in the hills back of the sanatorium buildings. Monte Vista Park in the Crescenta Valley has been improving as a play-ground, but the park is hardly large enough to accommodate the heavy increase of visitors and picnic parties. Additional ovens, picnic tables, swings, etc., have been installed and a modern comfort station has been installed for the convenience of visitors.

Large nurseries are operated where hardy coniferous trees are grown on an extensive scale for reforestation planting in the mountains, as well as nursery stock of every kind for other planting work which the department has in charge. Over half a million forest seedlings are now being raised in the reforestation nursery in Altadena and forest plantings are being established year by year at important points on burned-over areas of our mountain water-sheds. The department has engaged in extensive seed collection all over southern California to secure forest trees seeds in sufficient quantity for the needs of the reforestation nursery.

The protection of wild game throughout the county in accordance with the provisions of the state game laws is enforced by the department through the large force of deputy game wardens located in every part of the county. Special forces of wardens have been on duty through the open hunting seasons so that check can be kept on hunters and the amount of game taken. Many valuable game specimens secured by the department have been added to the collections of the Los Angeles

county museum. A larger planting of fish fry obtained from the state fish hatcheries has been secured to improve the fishing in the various flowing streams in the county. During the fiscal year, 74 arrests have been made for various violations of the game laws, which have resulted in 71 convictions and the levying of fines amounted to over $1,500.

Substantial progress has been made in developing an effective fire-fighting organization in every part of the county during the past two years since the work of fire prevention and control was taken over by this department July 1, 1920. The county has been divided into 150 fire districts with a local deputy fire warden in charge of fire protection work in each district. Extension of telephone lines has been secured to bring this fire warden organization into prompt telephone communication with the county fire warden. Many fire districts have been equipped with fire-fighting trailers under a plan of financial cooperation with the county. Fire boxes furnished with emergency fire-fighting equipment have also been constructed and located at strategic points through mountain districts so that fire-fighting tools are available where they are needed.

During the height of the fire season, special auto fire patrol was maintained over holidays and week-ends, when large numbers of people were camping and visiting in the mountains, wardens were stationed at fire lookout points, and a force of riders employed in cooperation with large land owners was put on duty in the hills. Through periods of special fire danger an aeroplane fire patrol was inaugurated which was most successful in detecting and locating fires and permitting quick measures for their control.

Active fire-fighting companies have been organized in many districts under direction of local fire wardens and through the cooperation of the department, local fire departments, in charge of a deputy fire warden, acting as the local fire chief, have been organized in a dozen unincorporated communities, most of which have purchased and installed automobile fire engines and other essential equipment.

Since a large portion of our mountain water-sheds lie within the Angeles and Santa Barbara National Forests, the department has joined with the Forest Service administration on every large fire. Similar cooperation has been arranged with the Los Angeles city fire department and with other large cities of the county for prevention and control of fires where city and county territory join. To enable the department to deal effectively with fires spreading from adjoining counties, Los Angeles County has been made a state fire district and the county fire warden has been appointed state fire ranger for the district. Fire assistants have been appointed as state fire wardens.

Construction of a comprehensive system of fire-break lines for fire control through the mountainous sections of the county is in progress, and nearly 50 miles of such fire-breaks have already been built. Besides the 20-mile firebreak down the main ridge of the Santa Monica mountains, which was built in cooperation with the land owners in this section, about 27 miles of firebreak in the Verdugo Hills and the Malibu range were constructed the past winter under joint appropriation between this county and the state. A total of $40,000 is being expended by state and county through a two-year period on this work, and surveys have been made to extend this firebreak system to completion through the Verdugo Hills and the Malibu range this coming winter. Construction of about 15 miles of lateral firebreak not provided for under the state and county appropriation has been arranged in cooperation between the county and interested land owners.

The fire menace from brush burning has been materially reduced by the operation of the county fire ordinance regulating under permit the use of fire for clearing land. Over 5000 burning permits have been issued during the year by deputy fire wardens and where 65 per cent of the total area burned over in the previous fiscal year resulted from careless brush burning, this percentage has been reduced to about 33 per cent during the present fiscal year. A further important fire ordinance has been enacted during the year which materially strengthens the authority of the county fire warden for the prevention of fires.

During the year ending June 30, 1922, the department responded to 281 fire calls in county territory and to 44 further calls from fires originating either in incorporated area or within the National Forests which threatened county territory adjoining. As a result of the effective fire warden organization of the county, 45 per cent of fires were checked after burning less than an acre and an additional 35 per cent burnt off less than ten acres. Record of damage in county territory which

can be expressed in terms of money, while undoubtedly incomplete, shows a fire loss of $522,623 during the year.

The department has investigated to determine responsibility for all fires during the year and as a result 60 arrests were made for violation of state and county fire laws, from which 52 convictions have resulted.

TAMALPAIS FOREST FIRE DISTRICT—$10,000.

This appropriation was handled by the board of directors of the Tamalpais Forest Fire District, which embraces about 75,000 acres in Marin County. The act providing for this district defines a region in the vicinity of Mount Tamalpais, in which all the taxable property is assessed for fire protection purposes. In this way about $9,000 is raised every year which is used, together with state funds, for the employment of patrolmen and the clearing and construction of fire breaks. The following reports by Mr. E. B. Gardner, chief warden of the district, gives the work accomplished during the past two years with district and state funds:

	1921		*1922*	
New trails cut	7,181 feet	$ 430 86	19,342 feet	$ 852 16
Old trails cleaned	37,757 feet	1,410 28	49,568 feet	2,363 53
Brush burning on trails		180 00		
Tools		166 96		261 64
Patroling (5 patrolmen)		6,834 00		5,746 20
Chief warden		2,160 00		1,980 00
Fire fighting		713 70		243 60
General expense		510 74		596 04
Totals		$12,406 54		$12,043 17

FIRE REPORTS FOR 1921 AND 1922.

The fire seasons of 1921 and 1922 were very severe in character. During both years the early rainfall was below normal over the greater portion of the state, and the temperature was very high. There was also a long period during each summer when there was absolutely no rainfall, and this situation was aggravated by high winds which made it extremely difficult to control fires. To the adverse climatic conditions was added a much greater human risk, due to greatly increased automobile travel, which brought a vast number of tourists, campers, hunters and fishermen into the remote regions of the state.

The fire losses on the areas protected in 1922 by the state fire organization were $732,994 as compared to $988,597 in 1921. A substantial reduction in the fire loss over that of the previous year was accomplished by the increased efficiency of the ranger force, and not because of a lessened fire hazard, which was especially severe in September. At the same time it is very evident that both federal and state fire organizations must be strengthened, since the fire hazard is constantly growing worse. The history of the disastrous fires that have occurred at different times in Minnesota, Idaho and Oregon can be repeated in California, if we do not use more stringent preventive methods. The potentialities are here for a combination of weather conditions, when appearing in conjunction with a fire situation as critical as existed in September, that will bring disaster and ruin on the whole community that may be unfortunate enough to be hit.

A great conflagration is apt to take place in the forests of California any year, unless civilization makes conditions safer. Thus far, civilization has worked to aggravate the situation.

Comparative Damages by Fires, 1921-1922.

Year	Number of fires	Average burned	Damage	Average acreage per fire	Average damage per fire
1921	1359	551,777	$988,597 00	406.	$727 00
1922	1171	369,071	732,994 00	315.	626 00

Types of Land Burned Over (Acres).

	1921	1922
Timber	20,313	57,431
Brush	206,362	140,820
Grass	301,438	153,205
Grain	23,664	17,615
Totals	551,777	369,071

Types of Classified Damages.

	1921	1922
Timber	$ 41,528 00	$120,356 00
Range	367,246 00	172,866 00
Grain	310,025 00	233,408 00
Improvements	189,735 00	166,892 00
Stacked hay	80,063 00	39,472 00
Totals	$988,597 00	$732,994 00

Causes of Fires.

	1921	1922
Lightning	12	14
Lumbering	9	27
Railroads	41	55
Brush burning	178	165
Campers	374	163
Tobacco	----	175
Incendiary	106	110
*Miscellaneous	311	193
Unknown	328	269
Totals	1359	1171

*Includes fires set in grain fields by sparks from machinery.

LAW ENFORCEMENT.

The repeated occurrence of unnecessary man-caused fires, through carelessness or wilfulness, has made strict enforcement of the state fire laws necessary. In 1921, a fire ranger with special training in law enforcement work was delegated to assist the district rangers in working up evidence on cases and bringing them to trial. In 1922 this work was taken over by Inspectors Fowler and Frost as a part of their field work. The following tabulation gives the results of law enforcement work the past two years:

California State Fire Law Enforcement Cases—1921.

Character of violation	Number of cases	Number of convictions	Number cash fines	Number jail sentences	Number acquittals	Amount of fines collected	Number cases settled out of court	Damage paid for cases settled out of court	Cases on which sentence suspended	Cases pending
Refusing to fight fire	1	1	1			$10 00				
Blasting or burning without permit	4	4	3	1					4	
Setting fire accidentally or carelessly	31	9	8	1	14	260 00	3	$99 78	3	5
Leaving camp fire burning or allowing it to escape	13	10	8	2	3	375 00			2	
Setting fire wilfully or intentionally	2	2	2			50 00			1	
Totals	51	26	22	4	17	$695 00	3	$99 78	10	5

California State Fire Law Enforcement Cases—1922.

Character of violation	Number of cases	Number of convictions	Number cash fines	Number jail sentences	Number acquittals	Amount of fines collected	Number cases set led out of court	Damage paid for cases se tled out of court	Cases on which sentence suspended	Cases pending
Refusing to fight fire	13	9	8	1	2	$95 00			2	2
Burning without permit	11	4	4	2	1	110 00	3	$39 13	3	1
Setting fire carelessly or accidentally	23	16	10	6	2	500 00	2	148 36	6	3
Setting fire wilfully or intentionally	7	4	3	*1	3	145 00				
Operating engine without spark arrestor	1						1	10 80		
Stealing state tools	1				1					
Leaving camp fire burning	3	3	3			150 00				
Totals	59	36	28	10	9	$1,000 00	6	$198 29	11	6

*Party shown as convicted for wilfully setting fire was later adjudged insane.

The removal of the forest cover results in severe floods and high water during the winter with disastrous erosion, while the summer low water flow is correspondingly reduced.

CONTINUANCE OF A WATER SUPPLY.

Irrigation is the "One Big Thing" needed in superior California. Perpetual water for irrigation can best be assured by the maintenance of a forest cover. A forest cover can not be maintained unless adequate fire protection is afforded. Therefore, it is evident that the future prosperity of superior California depends very largely upon the effectiveness of the protection of the forest cover on its watersheds, in which the water needed for irrigation is stored, to be given up gradually as needed.

That the flow of water courses will be diminished when their headwaters are denuded of their cover, has been known since the times of the prophet Joel, whose lament it was that "A flame hath burned up all the trees of the field," and "The beasts of the field pant, for the water brooks are dried up." Joel was the earliest preacher of the conservation of watersheds, and, in a sense, the real inventor of the slogan, "Prevent Forest Fires."

China had no regard for its forest cover, and as a result turbulent rivers have ruined great areas of agricultural land and rendered thousands of people homeless. China is now striving with infinite labor to re-establish a forest cover on its thousands of barren slopes. Spain and Italy afford modern examples of peoples made destitute through the lack of water and timber because of reckless destruction of their forests. Every nation that has upset nature's balance through the unregulated burning and cutting of its forest areas has witnessed the impoverishment of its people.

A number of years ago the flow of the rivers supplying power to the factories in the eastern states became so irregular because of the denudation of their watersheds, that the government appropriated millions of dollars to purchase forest lands at their headwaters, in order that they might be effectively protected and function as regulators of the stream flow. How much more important is it to maintain and regulate the water in the streams of California, where the water is valuable both for power and irrigation purposes?

The people of southern California consider a fire in their brush-covered mountains a catastrophe, since the destruction of the vegetative cover permits the water to rush in torrents over the steep, barren slopes, carrying earth and rocks to the fertile lands below. The only recourse under such conditions is the construction of expensive check dams, and these are often filled with debris in a short time. It is not until the vegetation becomes established on the denuded slopes that the run-off becomes regulated and water is conserved by the mulch formed by this cover, to be given up gradually so that it can be used to advantage.

The prevention of fire is the basic principle of forestry practice. Unless forest and brush fires are controlled, the natural regulators of stream flow are destroyed and the development of the region, which depends upon a perpetual flow of water, is retarded. The forests on the mountains of California must be kept green if there are to be an abundance of green fields in the valleys.

Since July 1, 1921, Forest Examiner Munns has been making a study of watershed areas for the State Board of Forestry in response to Senate Concurrent Resolution No. 27, which reads as follows:

WHEREAS, It is reported that there are large and rapidly increasing areas in this state which have been and are being denuded of timber and other vegetable protective covering, and which, because of such denudation, are not only a present and rapidly increasing economic loss to the people of the state, but are also causing a rapidly increasing destruction of streams and harbors, and are also interfering with and threatening to destroy, with constantly increasing rapidity the availablity of water for domestic, irrigation, hydro-electric power, mining, navigation, and other necessary purposes, be it

Resolved by the Senate, the Assembly concurring, That the State Board of Forestry be and hereby is directed to examine such areas and to report to the legislature, at its next regular session, the situation and approximate acreage of such areas as are most valuable for reforestation or recovering with other vegetable protection, and to report a plan whereby they may be reforested or otherwise covered with protective vegetation.

This report will be presented to the coming legislature. Following is a brief summary by Mr. Munns of his conclusions relative to the relation of watershed cover to the prosperity of the state:

WATERSHED PROTECTION.

By EDW. N. MUNNS, Forest Examiner.

There is probably no place in California, and certainly not in the United States, where the value of watershed protection is better understood or appreciated than in southern California. Here the rancher and home-owner alike are aware of the necessity for maintaining a heavy cover at all times on the mountain slopes above them, for where that cover is destroyed, their property is endangered by the floods and erosion that follows, while the water supply they are dependent upon for irrigation, from both the surface flow and the artesian basin, is jeopardized. This fact has been brought home to them time and time again through the damages they have suffered in the loss of improvements, ranch land, reduction in crop yield and interference with business. Some of the more recent incidents that are responsible for this appreciation of the protection afforded by the forested slopes may be given, though the need of protection has been felt ever since the region became thickly populated and water and land values became high.

Near San Fernando, in 1913, a watershed of a thousand acres was burned over through careless brush burning. The little colony of Little Lands was inundated the following February. Valuable land was ruined and a tremendous volume of detritus was piled up on the lands that the population had just placed under cultivation. In order to prevent a similar catastrophe and to keep the stream from leaving its channel, levees were built, but the first storm of the following year, and that but a small one, completely filled this channel with the gravel it brought down and the stream took a new course through this colony with attendant losses.

In 1915, a fire in Cajon Canyon, starting from a railroad locomotive, destroyed the cover on about 50 acres before it could be extinguished. That winter the high water washed away the irrigation system the ranches on the lands below depended upon for their water supply, while, in addition, some fine orchard land was washed away.

In 1918, following the removal of the cover from a mountain slope near Pasadena, a country home estate was endangered by the floods from this slope, the irrigation system was washed away, the source of the domestic water supply was buried and the beautiful grounds were covered with a layer of sand and gravel, which also covered much of the orange orchard adjoining.

In 1920, the eroded material from the great areas burned over during the preceding summer, caused by careless campers and residents, rendered transportation impossible by covering the roads and highways with the material brought down by the streams, filled a reservoir and an irrigation system full of mud and debris, and destroyed the usefulness of a small dam in one of the canyons. In a power plant near Azusa at the mouth of the San Gabriel Canyon, the sand in the water cut away the steel plates on the turbine wheels before the water could be shut off,

while the floor of the power house was covered with the sand and gravel brought down, and the generators and dynamos were badly injured. At Glendora, it is the practice to spread the flood waters of San Dimas Creek upon the flood cone of the stream to increase the absorption in the gravels and raise the level of the ground water. The attempt made in 1920 to do this damaged the debris cone and rendered it ineffective, for the flowing water did not clear itself of silt, and the silt soon clogged the pores in the gravel and made the absorption grounds almost impervious to water.

In November, 1922, the city of San Bernardino was greatly damaged by the results of a fire in City Creek, a few miles away. Tons of eroded material were deposited in the city highways and parks and the flood flow caused Warm Creek to overflow its banks and do much damage. Business was at a standstill and bridges were undermined and damaged.

While such statements are taken from the records of southern California, similar experiences differing only in degree and in particulars have occurred in the northern part of the state. They are, however, not as well known or appreciated because of the greater size of the drainage areas involved, the relatively smaller rural population, and the generally lower land and water values. One reason why the southern part of the state developed so rapidly has been because proper consideration was given the development of the water resources early in the history of the region, and similar proper development cannot go on where the relationship between the cover and the water supply is overlooked or neglected. A greater appreciation is being manifested as witnessed by the systematic study of the water question in relation to the development of agricultural lands.

We can develop our agriculture only as the water supply is made available for the land through storage and control, and it must be remembered that we can get only as much water from any given watershed as that area receives. After allowing for the amount evaporated from the soil and transpired, and used by the vegetation, run-off—both surface and underground—must equal the precipitation received. If then all the flow from an area takes place during the time of flood, that flow is lost when most urgently needed later on in the dry season, and at the same time this flow causes destruction because it is in flood. If that flood flow can be restrained and the water made to go into the ground, it then is released slowly and at a much later date through the gradual percolation to the underground basins and through seepage flows into the springs and streams. Absorption constitutes perhaps the most important factor in reducing flood flows and increasing summer flow, thereby equalizing the amount of water through the entire year.

Man has not been able to increase this absorption in any way. Dams have been used to hold the water in storage, but when the dam is full, the surplus waste water is lost. Check-dams in the small canyons are effective in causing some absorption, but these works are expensive to construct and maintain, and are not always effective because the silting makes the storage reservoirs behind them impervious to water. The maintenance of as heavy a plant cover as nature will permit to grow upon an area is the only means that man has at his command whereby he can influence the flow of streams. It makes no difference what that cover may be, whether it be grass, brush, chaparral or forest. If it is the highest type of cover that can be grown, it will increase absorption and affect the streams to the highest extent it is capable of.

The result of deforesting or denuding a watershed of its cover, or of reducing the density of this cover, or of replacing it with a poorer one, works to decrease this absorption. That is why the agencies of fire, unregulated lumbering, overgrazing, and smelter fumes are so disastrous to watersheds and why these watersheds must be protected to prevent the loss of cover. It is easy to appreciate the great losses involved when a forest ready for cutting is ruined or the feed upon which live stock are dependent for food is destroyed by fire, but we must realize that any fire no matter whether in our so-called worthless brush or chaparral, or in our forest or pasture lands, affects our water resource by wasting flood flows and increasing erosion through influencing the water holding capacity of the soil.

The water-holding capacity of the soil largely depends upon the amount of decaying vegetable matter there is mixed in with it. The agriculturist realizes this when he plows under straw or growing cover crops, for in addition to the fertilizer thus made, he is making the soil more retentive of moisture and thereby reducing the amount of water required for irrigation. Studies on burned-over areas show that after a fire in the chaparral the moisture holding capacity is reduced from 10 to 25 per cent the first year after a fire and up to 40 or 50 per cent in the following years. Thus a soil capable of holding 100 pounds of water before a fire could

hold only 50 or 60 pounds of water a year or two later. The rest of this surplus water must go off in the flow.

Increasing the run-off so rapidly, the water erodes and removes the soil, cutting gullies as it flows over the surface. Each gully lowers the water table slightly, the deeper the gully the lower the water table, and with the lowering of the water table, the density and growth of the cover is reduced, so that the effectiveness of the cover is further impaired, and therefore the influence of the cover upon the water supply is reduced. This would be a rather vicious cycle but for the one thing that plant cover, if protected, will gradually build up the soil to the condition it was formerly. Protection is needed then to maintain this cover to its highest degree.

While we can visualize the damage being wrought to a watershed by disastrous fires, because fire has always appealed to our imaginations, we perhaps fail to see that when an area is overgrazed to the point where the cover is practically gone, or where the area is destructively logged, that the cover has been impaired and its value is lessened as a water conserver. Yet such is the case.

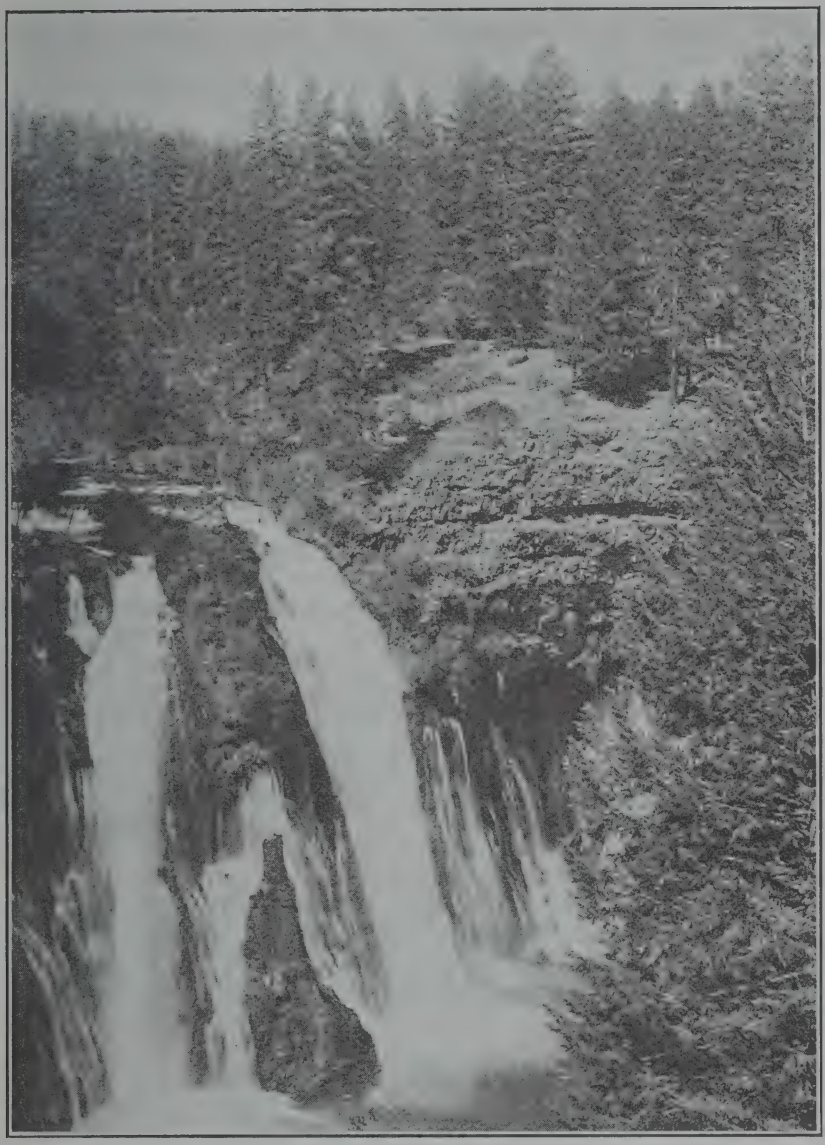
Overgrazing is a chief offender in those lands at low elevations, where the winter pasture is secured. Herds are confined to a relatively small area, where if rainfall is light or the season is backward, the natural forage is greatly reduced. Overstocking, improper management of the herds and natural causes result in the destruction of the cover as if fire had occurred, and gradually the stand of native plants dwindles, erosion starts, the water table is lowered and a poorer type of cover results, with its attendant greater run-off and lessened absorption. While no large streams may be affected, still such development in the industry assists in the rapid run-off of water and increasing the damage from flood flows to land lower down, while as in the case of fire the absorption is also greatly lowered, which reduces thereby the amount which can and does get into the artesian basin. Only education of those who are at fault in the livestock industry can prevent such occurrences because such mismanagement of the lands works to the detriment of the industry as well as to the other agricultural interests, through a reduction in the carrying capacity of the land and the production of meat products.

With lumbering, we have still another factor involved. While the carrying on of the business of the industry is perfectly legitimate and highly desirable from the standpoint of the production of a necessary product, it too can be carried on in a way that proves detrimental to the flow and regime of the streams. Any logging where the major part of the stand is removed causes a loss in the flow of the streams, because forests retard the melting of snow, reduce temperatures and lower evaporation, and the removal of the cover works to the opposite of these benefits and thereby augments the flow of streams and reduces the amount absorbed by the soil. As a greater and greater per cent of the stand is removed, the influence becomes more marked and as at the present time much less than 10 per cent of the trees are left standing, and these not of the best for water conservation, there is a correspondingly greater influence upon the run-off. With the ever increasing area of forest that is cut-over, this influence will be exerted more and more strongly.

There is one saving feature in all this, that of the possibility of so logging that the land will reforest itself naturally within the shortest possible time. This can be done through what may be termed conservative logging, which means the care of advance growth, the leaving of trees suitable for seed production, and the protection of the area from fire afterwards. With such precautions, the forest should regenerate itself rapidly and after cutting, the young trees should respond readily to the changed conditions. Thus in a few years time the area is again in a forest, not the sized forest that originally stood upon this area, but one sufficiently dense and as effective in regards to the water supply as the original stand and one from which in a few years we may again secure a supply of lumber suitable for our needs. Thus conservative measures such as are in force in many logging operations will pay not alone in the benefits to be derived from the maintenance of a protective soil cover of the highest type, but also in the production of future crops.

Watershed protection, then, not only involves the prevention and suppression of fire in our hills and mountains but also includes the maintenance of the highest cover possible upon all lands in the watersheds. Denuded areas must be taken care of by planting some vegetative covering or helping it to become established through care in management and use. Areas not now denuded must be protected from those agencies which may bring about the destruction of the cover, at the same time permitting the production of the highest type of product possible.

As written above, the maintenance of the highest type of cover possible upon a watershed is the only means man has at his command whereby he can influence the flow of streams. It therefore behooves him to so administer these areas that this cover may be protected from any destroying agent and so managed that the highest type of cover may develop and be maintained.



Burney Falls, Shasta County, and one hundred and sixty acres of pine timber surrounding it, were given to the State for park purposes by Mr. and Mrs. Frank McArthur as a memorial to McArthur's father and mother, John and Catherine McArthur.

CONTINUANCE OF RECREATIONAL AREAS.

A notable characteristic of the Californian is his love for the out-of-doors. He has magnificent playgrounds at his disposal in the Sierra pine and Coast redwood regions. Often times, however, when he arrives at his favorite last summer's camp site, he is dismayed to find nothing but stumps and slash where formerly stood splendid trees. It is to be expected that many recreational areas in the mountains will be spoiled for campers as the forests are cut to supply him with lumber for his use in the valleys, but it is possible to preserve many of them in their virgin condition for all time.

The State Board of Forestry is doing much to provide permanent playgrounds in the mountains for people, not only of California, but also those who come in such great numbers from other parts of the country. In the Sierras a new state park is planned at Burney Falls, Shasta County, one of the most picturesque places in California. Breaking from its underground channel, Lost River plunges nearly two hundred feet into the stream bed below in a myriad of rainbow colors. A most interesting feature of Burney Falls is the emergence of water in sheets from different stratas of lava. There are six or eight distinct lava stratas on the face of the falls, separated by layers of sediment from which water emerges in vapor-like form. This volcanic formation gives evidence of the former action of Mount Burney, a near-by extinct snowcapped volcano, 10,000 feet in height.

The Burney Falls tract comprises 160 acres and was deeded to the state by Mr. and Mrs. Frank McArthur of San Francisco, with the understanding that the timber and falls would be preserved as a memorial to McArthur's father and mother, John and Catherine McArthur.

Governor William D. Stephens requested the State Board of Forestry to take over the administration of this area, and as a result sufficient funds are being requested from the legislature to employ a caretaker and provide the necessary camping conveniences to make Burney Falls Park a place where it will be a delight for people to go. It is very probable that other gifts will shortly be made which will materially add to the area of this park.

The greatest state park development has been in the redwood region in Humboldt County. The state appropriation, coupled with gifts of timber lands from different sources has resulted in the establishment of the Humboldt Redwood Park, the history of which is given in the following article.

HUMBOLDT REDWOOD PARK.

Solon H. Williams, Deputy State Forester.

A few years ago a small company of earnest women of Eureka, Humboldt County, conceived the idea of saving a portion of the redwoods of Humboldt County for future generations. The idea spread all over the United States, and as a result of the propaganda instituted by this band of enthusiastic women, the Save the Redwoods League was formed in 1919. This organization, headed by Dr. John C. Merriam, of the Carnegie Institution of Washington, D. C., has worked untiringly to the end that a portion of these redwoods shall be saved. The League presented a bill to the legislature of 1921, appropriating $300,000 for the purchase by the state of certain tracts of redwood along the south fork of the Eel River, adjacent to the

state highway in Humboldt and Mendocino counties. This bill was passed by the legislature with but one dissenting vote, and was signed by Governor Wm. D. Stephens.

The bill provided that the acquisition of these lands and their future maintenance be placed in the hands of the State Board of Forestry. As soon as funds were available, purchases were made under the conditions of the act, and now the state has under its jurisdiction a continuous strip of land from the township line between townships 1 and 2 south, on both sides of the highway to Miranda, a distance of approximately 12 miles, excepting two pieces for which the owners are asking exhorbitant prices. The board in purchasing these lands has paid their commercial value and no more. All lands were purchased on a stumpage basis. No payments have been made until check cruises had been made by a reputable cruiser of the board's selection.

The following lands have been secured by purchase:

Name of Owner	Acreage	Price	Cruise Redwood	Cruise Fir
*Vance Bottom	297	$36,219 16	19,270,000	320,000
Sage Land & Imp. Company	394	60,000 00	16,944,600	582,200
Melinda Stoddard et al.	160	22,155 96	7,234,040	414,700
Standish & Hickey	40	2,000 00	1,600,000	75,000
Logan Estate	396	70,000 00	21,230,000	97,500
Devoy & Gillogly	120	30,000 00	9,387,000	250,000
**R. C. Chapman	47	22,000 00	4,825,000	55,000
Baldwin & McKinnon	200	18,991 16	6,371,000	786,000
Totals	1654	$261,366 28	85,861,640	2,680,400

*This grove was secured at a total cost of $61,219.16. Hon. William Kent and Hon. Stephen T. Mather contributed jointly $25,000 towards the purchase price, the balance, $36,219.16 being furnished by the state.

**Mrs. Clara Hinton Gould contributed $2,000 towards the purchase of this grove, which was paid in addition to the $22,000 above referred to.

Following is a list of lands donated to the state:

Name of donor	Acreage
Mrs. Perrott et al.	15
Hammond Lumber Company	30
Humboldt County	275
Dr. John C. Phillips	35
Save the Redwoods League	40
Standish and Hickey	3
Mrs. J. Hobart Moore, Mr. E. E. Ayer	160
Standish and Hickey	40
R. C. Chapman	7
Total	605

A bronze tablet has already been erected in the Bolling Grove to the memory of Col. Raynal C. Bolling, the first officer of high rank who gave his life to his country during the World War. Tablets suitably inscribed will be placed in each of the donated groves detailing by whom each grove was donated. Too much praise can not be given the Save the Redwoods League for their untiring activity in securing donations to this park. Other tracts will no doubt be donated adjoining the main tract and in other sections of the redwood belt in the near future.

Much work has already been accomplished in preparing the park for the use of campers and sight-seers. Permanent headquarters have been established on the Dunn and Dimmick property with a ranger in charge of the park. The headquarters house contains six rooms, and is for the use of the ranger only. A garage with four stalls, a bunkhouse with three sleeping rooms, and a cabin with two sleeping rooms have been built. An electric light system has been installed of sufficient capacity to light not only the administration buildings, but should occasion arise, to light the Dunn and Dimmick Grove. There has also been completed at the south end of the park, a two-room building for the use of a caretaker during the summer months. Sanitary conveniences have been installed in three of the groves, and a complete water system in two groves; tables and brick fireplaces have been installed for the use of campers and picnickers.

It is planned by the board to clear out the underbrush in a few places, so as to make these places available for camp sites, while other groves will be left in their present condition, except that such debris will be removed as will occasion danger from fire.

The State Board of Forestry, upon the acquisition of this property, decided that in view of the danger of trespass from split stuff operators, who are operating on property adjoining the park, that a definite survey and location of the lines of the state's property be made. Mr. J. N. Lentell, a licensed surveyor, was secured to perform this work, and all corners have been set and marked, and all trees along the exterior boundaries of the park have been tagged. It is also proposed to mark all corners with concrete stakes 6 inches by 6 inches, set 3 feet in the ground, so that danger of loss of these important landmarks by fire will be obviated.

While the danger from fire is not as great in the redwood section as it is in the pine regions, there is a great menace from fires to these trees which we are to preserve. It is perfectly true that fire does not as a rule consume these redwood trees, but it does weaken them to such an extent that they frequently fall, and in falling often destroy much healthy, vigorous timber. A fire line should be built and maintained around this park, especially at points of danger and where split stuff operations are being carried on.

STATE NURSERY AND HIGHWAY TREE PLANTING.

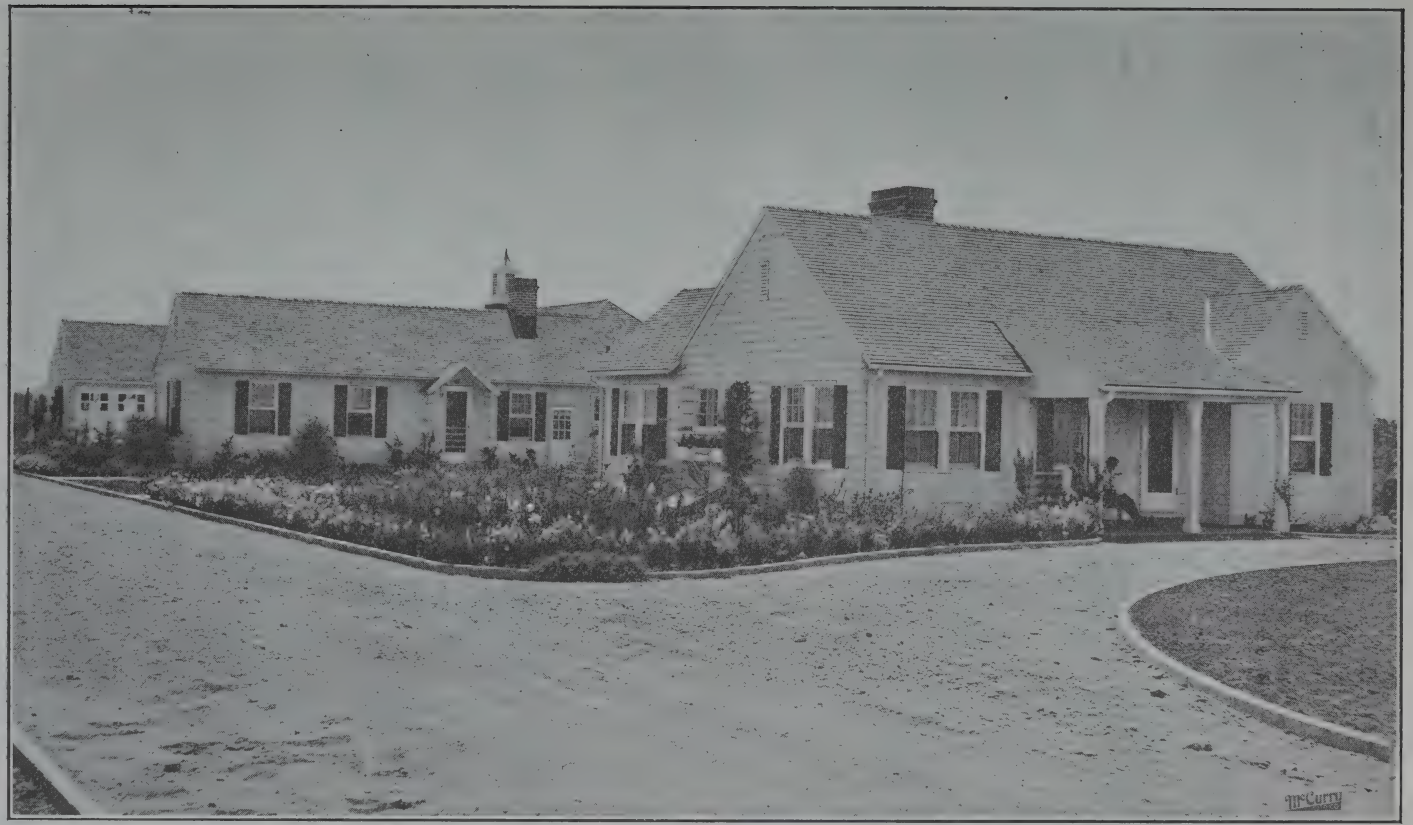
The State Nursery was established in response to the insistent public demand for trees along the state highway. For years this matter was agitated, until plans were formulated between the State Highway Commission and the State Board of Forestry, with the result that trees are now being raised and furnished for this purpose by the state.

A tract of thirty acres located along the highway between Sacramento and Davis was acquired by funds furnished by the State Highway Commission, and a sufficient appropriation was made by the last legislature at the instance of the State Board of Forestry to develop this site in accordance with plans made by the State Engineering Department. A bare field less than two years ago has now been developed by State Nurseryman Aldinger into a place of beauty, where thousands of trees are being grown to plant along the highways of California.

The buildings at the State Nursery conform to a well-worked out architectural scheme. Near the highway is a group of buildings of colonial design, consisting of the nurseryman's cottage, helpers' quarters, garage and implement shed, and barn. Bordered by shrubbery and flower beds, with a well-kept lawn in front of the cottage, this group presents a most attractive appearance from the highway.

Back of this group is the irrigation system and lathhouse. Water for irrigation purposes is pumped from a well by an electric motor pump into a concrete-lined reservoir with a capacity of 350,000 gallons. From this reservoir the water is diverted to all parts of the nursery by means of concrete irrigation pipes. By this means the cost of irrigation is greatly reduced in comparison with direct pumping from the well. In addition there is storage water available in case of accident to the pumping plant. Failure of the water supply at critical periods is a vital matter in growing nursery stock.

Many of the trees are first started in the lathhouse and not beds from seed. At present there are from 100,000 to 150,000 seedlings growing preparatory to setting out in nursery rows next summer. In order to reduce the time of propagation, however, large numbers of trees are grown in nursery rows from seed, cuttings and seedlings. For example, this spring black walnut seed, European sycamore cut-



Buildings at State Nursery near Davis, where trees are propagated for planting along the State Highways.

tings and American elm seedlings, which were placed in nursery rows, have developed into trees of sufficient size to plant on the highways this winter. There are about 60,000 trees now available for distribution.

The principal trees grown at the State Nursery are California black walnut, European sycamore, black locust, American elm and Lombardy poplar. It is realized that there are other species that are suitable for highway planting, such as oaks in variety, Norway maple, honey locust and various species of eucalypti, and a start has been made in propagating them. In addition, experiments are being made with little known species furnished by the Bureau of Plant Industry, such as Chinese maple, Chinese hackberry, Zelkova and pistache. Some of this material is being furnished for the landscape beautification of state institutions, but by far the major portion of the trees grown will be planted on the State Highways as rapidly as conditions warrant.

The plan of highway planting that is being followed is a cooperative one, which involves three different agencies, the State Highway Commission, the State Board of Forestry and the agency which makes application to plant the trees. All applications are referred to the Highway Tree Planting Committee, consisting of the State Highway Engineer, State Forester, State Gardener and the Professor of Landscape Architecture of the University of California, which prepares detailed instructions for the planting, after examination of the locality for which application is made. This plan is used as a basis for the terms of the planting permit issued by the Highway Commission.

The entire cost of planting, which includes the staking and protection of trees with wire netting where necessary, is borne by the applicant. The trees are furnished from the State Nursery, the only cost being that of transportation to the place of planting. It is estimated that the cost of planting will not exceed one dollar per tree. In many places it can be done for less, especially where blasting is not necessary. After the trees are planted they are maintained by the State Highway Commission, a task of no mean proportions since it involves regular watering and cultivating, and a constant warfare against pests such as borers, grasshoppers and gophers.

Last year 7600 trees were propagated at the State Nursery and distributed for planting on the state highways. Besides this stock, there were gifts of trees and shrubs from the Monterey Tree Growing Club, Division of Forestry and Division of Landscape Gardening of the University of California, which were used. Permits for planting from and including 1920 to the end of the fiscal year 1922 were issued for a total of 99.85 miles. Examination made at the end of this season shows a 75 per cent survival. The chief causes of loss were drowning from excess irrigation water from adjoining land, borers and grass fires.

This year there will be a considerable increase in the amount of planting done, on account of the increased number of trees available for distribution. The state highway will be planted from Red Bluff to Corning, a distance of 18 miles, from Marysville to Wheatland, a distance of 11 miles, and from Livingston to Turlock, a distance of 10 miles. Highway planting will also be done in Sacramento, Placer, Napa, San Diego, Tulare, Glenn, Colusa, San Joaquin and Santa Clara counties. It is expected that at least 150 miles of state highway will be planted the coming winter and spring, an undertaking that speaks well for the mental attitude and spirit of Californians.

TREE MAINTENANCE ON STATE HIGHWAYS.

By W. E. Glendinning, Highway Tree Expert.

The original planting of trees on the state highways as well as any replacements made, develops on the individual, club or society making the request, after which they pass immediately into the hands of the Highway Commission, which assumes the responsibility for their maintenance. In keeping with this program it soon became apparent that it would be necessary to centralize the care of these plantings under a qualified tree expert, who would act in an advisory capacity to the California Highway Commission, under the general supervision of the State Forester.

The writer was selected to carry out this work and on May 15, 1922, began checking up the several different highway plantings throughout the state and as rapidly as possible began forwarding memoranda as to their condition and requirements. This work has been carried on without interruption and as a result nearly all the plantings on the highways of the state have been checked up, reported upon, and where found to require attention, steps have been taken to remedy existing troubles.

It was found that, as in all new undertakings, the care of these plantings should have come under systematized control at an earlier date than they did and that a realization of their requirements, both as to planting and care, was lacking. It was not an unwillingness to attend these trees that was responsible for their condition, but more of a lack of knowing just what should be done for their preservation that caused the decadency and finally the death of a certain per cent of them.

Of the 40,000 trees planted on the state highway, during the past two years, approximately 25 per cent will require replacement due to having died from various causes. This represents some little loss, but is not out of the usual. Had it been possible to have taken these trees over earlier in the season more of them could have been saved. Soon after these investigations began it was thought best to turn activities into the line of salvaging all possible of the younger planting before it became too late. In consequence the work was directed along this line and as a result of the season's work, from 10,000 to 15,000 trees have been saved and started on the way to permanent establishment that would have perished in the event of attention being withheld.

Various agencies are responsible for the loss of trees and they are taken up with limited explanation, under the following headings:

Planting.

The greater part of the loss of the trees represented by the 25 per cent mentioned above was due to improper planting. In a number of localities the trees were not placed at a sufficient depth in the ground to allow for the proper covering of the root system, while in other cases they were literally trampled into the wet earth. This latter trouble was generally found to follow a "community plan," where no one was in charge and usually the planting held in order to afford an opportunity of having a picnic. In every section, it is plainly in evidence that had more attention been given to the initial planting of the trees, the loss would have been materially lessened. This trouble will be overcome in the future since the State Forester will have a representative present to supervise all plantings.

Overflow.

A heavy loss is due to the planting of trees in the ditches and deep "borrow pits" that parallel the highway proper, where no drainage was afforded and where the irrigating water from adjoining fields was allowed to stand at the base of the trees, throughout the year. This resulted in "sour sapping" the roots and in no case where a tree was thus inundated did it recover. An oportunity was found to drain away the water at some points and where this could be done, the trees were saved. Until such time as this matter can be remedied, it is unwise to make any attempt at replacement.

Drought.

Many trees throughout the state are, necessarily, planted in what can be termed semi-desert situation. Of these there was a loss due to the soil drying out before their condition was realized. As soon as attention was directed to this, the trees were watered and many saved that would have perished had irrigation been longer delayed.

Shade trees are as necessary for the development of child life as good teaching.

Monterey cypress on the State Highway badly infected with cypress bark scale. Sprayed under direction of W. E. Glendenning, Highway Tree Expert.

Cultivating and Mulching.

Some trees were lost due to the lack of proper cultivation, owing to the hardening of the ground following planting in a wet season. This was corrected as soon as possible and a suitable amount of mulch distributed around the base of the trees in order to prevent the baking and cracking of the ground. This mulch also served a double purpose in that it was instrumental in the conservation of water. In the extremely hot areas, it was estimated that the mulching with straw reduced the demand for water from 25 to 40 per cent as compared with the amount originally used. This alone is an item of major importance where the water is conveyed a long distance in tanks.

Wind.

In many localities, particularly in open areas, considerable damage was done by wind. This damage was pronouncedly in evidence where the soil was of a nature to give rapid growth to the trees. The trees were seldom broken, but the wind continually blowing from the one direction so trained the top and branches that it gave a leaning, "lop-sided" angle to them that did away with any chance of their becoming worth while. This condition was very noticeable at Santa Rosa, Petaluma and Madera, as well as in the long line south of Bakersfield. This trouble was corrected by drastic pruning, after which the trees were tied securely to stakes provided for the purpose.

Alkaline Soil.

Trouble has been encountered as a result of certain varieties of trees having been planted in soils heavily saturated with alkali and a number have died as a result. In replanting, in these areas, it is proposed to neutralize this ground with a lighter soil and also to select more adaptable trees for replacement.

Insects.

Aside from careless planting, insects have been responsible for the greater loss of trees. A small per cent of this loss is due to the devastation caused by grasshoppers, but fortunately ample time was afforded to forestall their ravages. It was found necessary to bag, approximately, 14 miles of trees, This method proved effective and as a result a thousand trees were saved. This experiment was worked out at Oroville, Willows and Orland.

The greater part of the loss from insects was due to the activity of "Flat-head" borers—Buprestid larvae. A partial control of this menace was undertaken, but the damage had been brought about prior to a time of the organization of forces necessary to combat this pest. Borer control consists of the application of repellent washes to the trunks of the trees, early in the season and at a time when the adult insects are active, following emergence from the overwintering stages. If, during the spring months, the insects can be prevented from depositing eggs on the outer bark by treating the trees to washes that will repel them, no further trouble will be experienced, but once the eggs are deposited and left undisturbed until incubation takes place, at which time the larvae immediately enters the cambium bark, the tree has but little chance. Occasionally one will live through a single attack, but ordinarily it is so retarded in growth that it is the better policy to replace it with a new unaffected tree.

It is proposed to devote every energy to the control of this particular insect. A collaboration has been effected with the Branch of Forest and Shade-tree Insect Investigation, U. S. Bureau of Entomology in order to better further this work.

Pronounced damage and loss from borer attack occurred in the planting between Sacramento and Woodland, the Sacramento County planting and at Oroville, Lodi, Gridley, Willows and Santa Rosa.

Fire.

Some little loss has been brought about by fire, but if instructions are followed in regard to clearing back the grass and weeds a certain distance from the trees, together with the required cultivation, no further trouble need be feared from this source.

Loose Stock.

Trees have been lost, owing to having been trampled down by loose stock, either driven or left to graze on the highways. Bands of sheep that are driven from point to point, on the roads, have been responsible for the greater part of this

damage. As an example, 70 fine specimens of Chinese pistachio were destroyed, in the Chico planting, in a single day, by sheep. This danger became so menacing that steps were taken to protect the trees by placing wire guards about them in all sections where there was any likelihood of sheep and cattle being moved. This guarding of the trees is to be continued and all permits for planting issued at the present time call for the requirement of a uniform wire guard being placed around each tree. This guard to be furnished and put in place at the expense of those to whom the permit is issued.

Root Pruning.

Loss of trees has resulted from the undue pruning of roots prior to a time of planting. This trouble has been due to the lack of proper supervision at the time the trees were installed. It was found in one instance, where trees were planted under contract, that the root system had been cut away to allow for the planting of the trees in shallow "pot-holes" and at the same time the tree was left to a height of from ten to fourteen feet with no effort made to cut it back. Also, trees coming from the nursery have been carelessly handled and in some cases have been distributed along the line of holes days before they were planted. Under the present method of procedure this can not occur again since no trees are to be distributed until such time as some one has assumed the responsibility for their proper care.

It is only fair to add that the nursery stock referred to in the foregoing paragraph was not shipped from the State Nursery and was, all in all, a private enterprise. However, this did not do away with the expense attendant upon the planting prior to a time of discovery of true conditions.

It can be seen from the rather formidable list of destructive agencies given above, that difficulties are in evidence at every turn and it is impossible to come in contact with a single project in the state without encountering trouble which in each case presents a different angle. However, it is a satisfaction to know it is only the lesser part of the trees that have met with disaster and that we still have many miles of splendid trees, lining the highways of the state, standing as a testimonial to the enterprise and forethought of the men and women responsible for their being.

Commercial Valuations.

Trees are planted, primarily, for the purpose of beautifying and ornamenting the byways, sections and areas which they are to surround and occupy, but in considering this phase of the situation, we are apt to lose sight of the part they take as effecting the economic status of the community.

In regard to the highway planting the value of trees in the outright protection of the roadbeds and surfacing is a matter best answered by the engineer, but beyond any worth of this nature, we have a right to place a direct valuation of fifteen dollars on every tree that has reached its seventh year. This is a fair valuation and in keeping with data assembled by the federal authorities throughout the entire country. Also, in placing this value on ornamental trees, arrived at by comparative estimates, it does not mean that they could be purchased for this sum, or for that matter, double the amount given. The $15 per tree represents but little more than a fuel value.

It is decidedly worth while to consider the value of a well established planting as to the influence it brings to bear on the surrounding and adjoining areas. This is a question that is not debatable in the face of expressed opinions, heard every day, to effect "that a locality supporting a stand of trees such as these must necessarily amount to something" and is accepted as proof, that where ornamental trees can be grown nothing will prevent the same accomplishment in the way of the establishment of orchard and vineyards, in the same sections. And beyond this, the presence of well kept plantings, extending along the roads from community centers, gives an impression of stability and enterprise that is bound to attract the attention of worthwhile people who desire and who are looking for an opportunity of casting their lot among fellows of their kind. As evidence of the productiveness and possibilities of a locality and as a direct advertising medium, the highway trees are worth every effort expended in their creation. It is much a question as to whether it would be possible to accomplish an equal objective through any other channel where an equal outlay of funds is to be considered.

The few reasons given above as having a bearing on the immediate commercial value of the trees only lead to the contemplation of many more, such as influence on public health, shelter and others too numerous to take up in an article of this length.

The Old Planting.

In many localities the line of the State Highways has taken the route of the former county roads. These roads, in many places, were bordered with trees which were included in the transfer to the Highway Commission. Those responsible for the reconstruction of these roads have been watchful to a degree that every effort was exerted in the preservation of the plantings. In favored localities the major part of the old planting is in a fairly acceptable condition. Yet scattered throughout every section can be found trees, that, due to continued neglect, are in a decadent condition.

Thinking that the salvaging of the newly planted trees required the first attention and knowing that even the worst of the old trees would survive, at least another year, it was thought best to direct the work of preservation to points where it was most needed. As a result of this, with few exceptions, such as the removal of objectionable trees, either in part or as a whole, the old plantings have received but little attention. However, one exception to this program was made. On the highway five miles north of San Rafael near the little village of Ignacio, is a line of Monterey cypress. This line of trees, planted some 30 years ago, originally consisted of about 160 specimens, but at the present time only 124 remain. The death of the 35 to 40 trees is due to the presence of an infestation of Cypress bark scale (Enhornia cupressi) and it was discovered that the remaining trees were heavily infested with the same insect in a way and to an extent that their survival was a matter of but a very few years, at least. Taking into consideration the position of these trees and their manifold benefit to this particular piece of road, the matter of saving them was looked upon in the light of an emergency. In consequence of this a request was made of the Highway Commission for the necessary material and authority to apply it. The material was furnished and authority granted and as soon as possible these trees were sprayed with an 8 per cent solution of a high gravity miscible oil. This work was carried through in cooperation with the Federal Bureau of Entomology and Mr. Burke, specialist in charge, stationed at Palo Alto, California, gave the matter his personal attention. We have every reason to believe the work to have been successful and as a prediction, unless the same methods are used in other cases, these will be the only trees of this variety left before the expiration of the next five years. Hundreds of like trees are either dead or dying from the same cause, throughout the state, but due to the isolation of the group treated, it is agreed by those familiar with the life history of the insect, that a term of some years will elapse before they can accumulate in sufficient numbers to bring about material damage to the planting that was subjected to control measures.

The cost of control was less than $2 per tree and when it is taken into consideration that the cost of rearing a tree of this size represents an outlay of from $10 to $15, it can be concluded that work of this nature comes under the head of good business. Attention is directed to many similar situations throughout the state with a request that the work prosecuted at this point be carefully watched in order that its effectiveness may be determined.

The men and women of California have taken upon themselves the task of planting the highways of the state with trees. As has been mentioned before, the primary reason for this work is to beautify, ornament and adorn these same byways, as well as to add a measure of comfort, pleasure and happiness to mankind. There is another reason for this great work also. Although it probably is not always uppermost in mind, it is the inherent desire on the part of every normal human being to erect a monument to him or herself that will stand established as a mark of achievement. To this end, the planting of trees is no new thing. It has been for all time. We of today can see around us magnificient trees that were planted by our fathers and planted and tenderly cared for by them with no other thought in mind than that of contributing to the welfare of those who were to follow on.

It was ever thus, for it requires but little research to bring to light the very fact that we are today planting like trees and under like names as were in existence at the first dawn of history, as well as planting them with like motives, that of having our part in contributing to posterity and in turn, as our wage, to be remembered as a builder on the Earth.

EDUCATIONAL WORK.

"Forest Protection Week" was widely observed in California during the week, April 16 to 22, 1922. Much publicity matter was sent out by the State Forester and the U. S. Forest Service, and many talks on forest protection were given at public gatherings by members of both these organizations.

Governor Stephens issued the following proclamation, which was broadcasted throughout the state:

Whereas, The Forests of California, with proper care and protection from fire, will supply by their recurring growth for generation after generation, the needs for timber of all our citizens; and

Whereas, During the summer of 1921, forest brush, grass, hay and grain fires devastated 698,357 acres in California, causing a direct monetary loss estimated at $942,977; killing young trees, the value of which, fifty years hence, cannot be estimated; destroying pasture that should have fed hundreds of cattle, sheep and horses; denuding watershed areas of growth needed to conserve water from winter storms for summer irrigation and electric power purposes; leaving barren waste in place of sylvan beauty; and

Whereas, With our growing population our forests are becoming more valuable, both for timber and for the enjoyment and recreation of our populace and tourists from other states; and

Whereas, By reasonable care and protection this great loss can be greatly reduced, our forests preserved, our hay, grain and pasture conserved;

Therefore, I, William D. Stephens, Governor of the State of California, do proclaim the week April 16 to 22, 1922, Forest Protection and Fire Prevention Week, and call upon all of the citizens of California to pledge themselves to exercise watchful care against the starting of fires, either in forests, pasture, or grain areas and to extinguish them promptly when by mischance they do occur, knowing that so to do is to perform one of the most important services that can be rendered to the present and future welfare of our state.

Let teachers observe the week by impressing upon our boys and girls this duty.

Let ministers instruct their congregations.

Let associations such as the Boy Scouts, Farm Bureaus, patriotic and benevolent societies, Chambers of Commerce, Women's Clubs and the like join in this crusade to protect ourselves and our posterity.

Let railroads take all steps needful to prevent or extinguish fires along their rights of way.

Let fishermen and all who use the forests or countryside for health or recreation, see to it that their fires are kept safe and that carelessness does not endanger that which they enjoy.

Let all citizens adopt as their slogan for this and succeeding years, "Help Prevent Fire," and thus preserve the beauty and wealth of our beloved state.

WILLIAM D. STEPHENS,
Governor.

The importance of teaching children the necessity of care with fire was recognized by the last legislature, which passed a law making courses in fire prevention study compulsory in all elementary, secondary, and normal schools of the state. As a consequence, "Forest Protection Week" received much attention in the schools. The Superintendent of Public Instruction sent out "A Forest Fire Prevention Manual for the School Children of California," which was prepared by the State Forester and the United States Forest Service, with the following foreword:

To the Teachers of California:

Permit me to call your attention to the fact that section 1665 of the Political Code, as revised by the last legislature, makes it obligatory upon teachers to give instruction in fire prevention. This includes the prevention of fire not only in

buildings but also in forests and fields. The State and the United States Forestry Departments have prepared this bulletin in order that the matter of fire prevention may be adequately presented. I am sure I need not urge the law upon the teachers of California. They have always responded whenever a public need has been brought to their attention.

California has wonderful forests that adorn the mountain regions. They are the playgrounds of hundreds of thousands of the people; they are the source of much building material; they contain the springs of great rivers that make the plains fertile. They must be preserved not only for the sake of future generations but also for the present generation. Destructive fires sweep over great sections of the forest each year. Many of these fires are due to carelessness. The teaching of fire prevention in forests is a great public need. I appeal to the teachers to give this matter earnest attention during each school year, especially during forest fire prevention week, and I know that this appeal will not be in vain.

Very truly yours,

WILL C. WOOD,
Superintendent of Public Instruction.

There is no doubt but that the education being given the present generation of school children in California in fire prevention is going to have a decided effect in reducing fire losses in the future. The Boy Scouts in particular are rendering signal service to the state, not only in fire prevention, but also in fire suppression. This summer the Santa Cruz Boy Scouts, under the leadership of R. E. Burton, a teacher in the Santa Cruz High School, did splendid work in assisting to control a forest fire near Soquel.

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